A MANUAL OF PERSONAL HYGIENE

BUSSEY

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BY

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PREFACE

To present the most important facts of personal hygiene briefly is the object of this Manual. The information which it contains has been gathered from a variety of sources, and, while opinions may differ as to some of its statements, it is believed in all essentials to be correct. As it has been prepared from notes which came gradually into existence through the teaching of classes in hygiene, it is impossible to give individual credit to those whose ideas have been utilized. Therefore the author takes this opportunity of thanking them all. He desires especially to thank Mr. Samuel F. Tower of the Boston English High School, Miss Laura S. Plummer of the Boston Normal School, and Dr. Franklin B. Dyer, Superintendent of Schools, Boston, for valuable criticisms and suggestions; Mr. Francis J. Conlin of the Boston English High School, Miss Lillian J. MacRae of the South Boston High School, Edward J. Grainger, M. D., of East Boston, and Eugene Lyman Fisk, M. D., Medical Director of the Life Extension Institute, New York, for reading the manuscript; and Louis Faugeres Bishop, M. D., Secretary of the Society for Instruction in First Aid to the Injured, New York, who has so generously placed at his disposal the society's handbook, from which Chapter XXI is drawn.

G. D. B.

CONTENTS

TO THE TEACHER

True to its title, this little volume is a Manual. It contains only what every pupil should be required to learn. There is nothing to be omitted. It is left to the teacher to supply the illustrative material.

Logically the subject matter of the Appendix, which treats of anatomy and physiology, should precede rather than follow the chapters on hygiene, as arranged in the text; and there is no reason why it should not be taken up first if that is the teacher's preference. It is the author's experience, however, that in the limited time which can be allowed to anatomy and physiology in a course which does not exceed forty lessons, the amount acquired by pupils does not add materially to their grasp of hygiene. Moreover, teachers of experience in these subjects know very well that pupils do not take the interest in anatomy and physiology that they do in hygiene. In fact, set lessons in the former subjects may even act as a damper upon their enthusiasm. It would seem best, therefore, to weave into the course, from time to time, such parts of the Appendix as may be readily applied, and as much more of anatomy and physiology as the teacher may find time for without actually giving any assigned lessons on those subjects.

Pupils should be encouraged to ask questions and to take part in discussion, care being taken that discussion does not lead to waste of time. It will be found that they have some knowledge upon nearly every topic, and opinions which they like to express. Upon these the teacher must pass judgment,

and by helping them to coördinate what they already know in a fragmentary way can add greatly to the value of the course.

To insure the best results the classes in hygiene should not be larger than those in other subjects in the same school; and, as in other subjects, promotion in hygiene should be earned. A mark based upon inspection may be given for general appearance, including cleanness of teeth, hands, and clothes; but too much emphasis must not be placed upon this, because so much depends upon home conditions over which the pupils have little control. It is greatly to be regretted, however, that there is no way of actually finding out how many pupils brush their teeth, chew their food properly, bathe regularly, sleep with their windows open, etc. If there were, promotion would be easy. Until some way is discovered, we shall be obliged to resort mainly to the conventional method, — promotion by lessons learned but not necessarily put into practice. Moreover, the pupils must be made to understand that they are not at liberty to forget lessons that are past. To attain this result it will be necessary to devote a part of each lesson to review. The answers to questions may be oral or written. Written answers, which put the whole burden upon each pupil, and from which there is no escape, will prove very effective. The questions should be so selected and worded that the answers may be brief, — a word or, at most, one sentence, to save the teacher's time in correcting. Set examinations may be held at the discretion of the teacher.

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CHAPTER I

THE IMPORTANCE OF HYGIENE

Hygiene, which treats of how to keep well, is neither a disciplinary nor a cultural subject. Its object is utility. It is not sufficient that the pupils learn their lessons; they must put their learning into practice. By this standard the success of the course must be measured. Every pupil ought at least to carry from the course a lasting impression that health is a boon of inestimable value which may be easily squandered or easily conserved.

While systematic knowledge of how to keep the body in condition, so that it will not become a prey to disease, has not kept pace with the progress in other branches of medicine, yet the foundation of such a science has been well laid. Much knowledge of this character is available and should be possessed by all, for the prevention of disease is more important than its cure.

A famous physician,[1] upon being asked for a rule for living to a good old age, replied that one must be afflicted with an incurable disease. This is merely stating in striking terms the well-known fact that frail people often

[1] Dr. Oliver Wendell Holmes.

outlive the more robust. In this seeming paradox is an important lesson for the student of hygiene. Frail people usually learn early in life to take care of themselves. They are careful about what they eat, bathe frequently, insist upon fresh air, go to bed early, are careful not to overtax themselves, avoid alcohol, tobacco, and all excesses, — in short, they learn to live hygienically.

The physician's answer suggests another important lesson which must not be overlooked. If the discovery of some bodily impairment is sufficient to cause a person to live so hygienically that life is measurably prolonged, it is doubly important that such impairment be discovered early. Therefore every person should have a thorough examination by a physician once a year, to discover bodily disorders before they progress too far. Many diseases which yield readily to treatment in their earlier stages are incurable in their later ones. The importance of having a periodic physical examination cannot be over-emphasized. Of the means at our disposal for keeping well this is one of the greatest.

QUESTIONS

1. Define hygiene.
2. What besides learning their lessons is expected of pupils in hygiene?
3. What truth should be deeply impressed upon their minds?
4. What knowledge should be possessed by all?
5. Who was the famous physician mentioned in the text?
6. What is the meaning of his answer?

7. Do you know of any examples of the truth of this answer? Ask your parents if they do.

8. Name five things which are good for the health.

9. Name three things which are bad for the health.

10. Why is it important that bodily impairments be discovered early?

11. What is one of the most important means at our disposal for keeping well?

CHAPTER II

HOW THE BODY GETS HEAT AND ENERGY

The body compared to an engine. The human body has often been compared to an engine. In many respects they are similar, but there is this difference, — that the body is much more complicated than any engine and that it cannot be taken apart and examined as an engine can. They are alike, however, in that everything they do is at the expense of energy.

Digestion. To obtain this energy, food is as necessary to our bodies as fuel is to an engine. Unlike the fuel, however, our food must undergo a thorough change before it can serve its purpose. To bring about such a change is the work of the organs of digestion. These include the mouth (with the teeth and salivary glands), the throat, the gullet (esophagus), the stomach, the intestines (small and large), the liver, and the pancreas. Their function is to convert the food into a state in which it can be absorbed by the blood vessels.

Circulation. After the food has been digested and absorbed, it must be carried to all parts of the body. This is the function of the organs of circulation, which are the heart and the blood vessels. The heart is a pump. The blood vessels are of three kinds: arteries, veins, and capillaries. The arteries carry the blood away from the

heart; the veins bring it back. The capillaries are minute vessels which connect the arteries with the veins and form a network in every part of the body. It is from the capillaries that the tissues get their food.

Respiration. Some of the food is used for growth, some for repair, and some to supply heat and energy. Heat and energy are produced by oxidation (the union of oxygen with some other substance). Here again we find a similarity between the human body and an engine. Fuel is oxidized in the engine; digested food is oxidized in our bodies and actually becomes the fuel of the body. The air, supplying oxygen, enters the furnace of the engine through the draft; it enters our bodies through the nose and mouth. If air is completely excluded from the furnace, the fire goes out; if it is excluded from our bodies, life ceases at once.

The parts of the body which assist in supplying oxygen are called the organs of respiration. They are the mouth, nose, throat, windpipe, and lungs; the nerves, muscles, bones, and cartilages of the chest, by whose action the air is renewed in the lungs; and the blood vessels, which bring the blood to the lungs to receive the oxygen and which serve as channels of communication between the lungs and the tissues. While it is from the lungs that the oxygen finds its way into the blood, there is no special place where the oxidation occurs. It seems to occur everywhere. Through this oxidation we get heat to keep our bodies warm, and energy to support the numberless activities of which our lives consist. Oxidation is greatly increased during muscular exercise.

Excretion. In the fire of a stove or of a furnace the coal is destroyed by oxidation; but the carbon, of which it is mainly composed, is not destroyed but is simply changed, by its union with oxygen, to another substance. This new substance, an invisible gas called carbon dioxide, would smother and put out the fire if it were not allowed to escape up the chimney. In the human body there is no chimney, but a way is provided for the removal of carbon dioxide and other products of oxidation which are formed and which must be removed if life is to continue.

The parts of the body whose work is to remove these waste products are called the organs of excretion. They are the lungs, the kidneys, and the skin.

If the organs of excretion are all working well, the carbon dioxide and other products of oxidation are removed from the body and no harm is done by them. If, however, any of these organs are unable to do their work, some of the products remain in the body, with serious results to health. Other harmful products may be formed by the decomposition of food. The presence of decaying food in the intestines may be due to overeating or to inability to digest a proper amount of food. Many of these poisonous substances are absorbed by the blood and must be removed from the body. This extra burden is liable to injure the excretory organs and, through their failure to do the work required of them, to impair the functions of all the other organs.

Bacteria. The decomposition of undigested food in the intestines is caused by bacteria. Bacteria are extremely small living things which are swallowed with the food

and which are always present in the intestines. They are so small that it would take thousands of them to extend an inch, and they can be seen only by using the highest powers of the compound microscope. They are all about us, — in dust and dirt, on our hands, clothing, and food, and even in our mouths. There are many kinds of bacteria; some of them cause decay, and others cause different kinds of diseases.

How the body defends itself. The body is well supplied with means of protecting itself against all kinds of bacteria. If they attempt to invade the body, they are met by the white corpuscles of the blood (called devouring cells), whose special duty is to destroy the bacteria. These devouring cells are assisted in their work of defense by certain important secretions of the internal organs. If the body is to resist successfully the attacks of bacteria, every part must do its duty. The question of how to keep the parts of the body in condition to do their full duty will be taken up in the succeeding chapters.

QUESTIONS

1. State two ways in which the human body differs from an engine. In what way are they alike?

2. How does food resemble fuel? In what way do they differ?

3. Name the principal organs of digestion. What is their function?

4. What is the function of the organs of circulation?

5. What is the work of the heart? of the arteries? of the veins? of the capillaries?

6. State three ways in which food is used in the body.

7. Define *oxidation*. What is oxidized in the body? What is produced?

8. How does the blood get its supply of oxygen?

9. What are the principal organs of respiration?

10. Where does oxidation in the body take place?

11. Name a substance which is formed by the oxidation of food. Why is it necessary that this and other waste products be removed from the body?

12. What are the principal excretory organs?

13. In what other way may harmful products be formed?

14. What are bacteria? Where do they occur? What do they cause besides decay?

15. What are devouring cells? What is their duty? How are they assisted?

CHAPTER III

BREATHING

Importance of pure air. The things most essential to human life are food, water, and air. The most important of these is air; for we can live for weeks without food, for days without water, but not five minutes without air. Oxidation of the blood is the most important of all bodily functions. All the blood in the body passes through the lungs in a few minutes. It comes to the lungs to receive the oxygen of the air and to give up carbon dioxide.

The energy by which we live and move, and upon which every organ depends, comes from the oxidation of the food we eat; and the food is absolutely valueless unless oxidized. We are very particular about the amount and quality of the food we eat, but are very heedless about that which is a hundredfold more important, — the air we breathe. We are content to fill our stomachs to their fullest capacity with the finest food, and then sit in an almost air-tight room and breathe stale, impure air. Nature has provided us with a bountiful supply of pure, fresh air, and with the lungs to use it, but the majority of people breathe only just enough to keep alive. We have acquired the habit of shallow breathing and ordinarily use only about one fifth of our lungs. The remaining four fifths becomes weak from disuse and is easily made the prey of the germs of consumption and pneumonia.

Benefits of deep breathing. The lungs must not be left to take care of themselves, but must be carefully developed. There is a general belief that the remedy is to be found in athletics; but muscular exercise, though of great benefit in many ways, is not always a remedy for insufficient breathing, for the muscular system is likely to be developed faster than the lungs, and the result will be a lung capacity as inadequate as before. Most athletes have a low lung capacity as compared with the size of their bodies.

The true remedy is to be found in *forced breathing*, — filling the lungs to their fullest capacity forty or fifty times a day. This can be done anywhere and at any time, but it is most beneficial if performed in the open air or at an open window. An excellent opportunity is afforded in most schools where special breathing exercises are required. The value of the exercises is not always realized, and the result is that many pupils go through them in a perfunctory way. These exercises are the very best that can be devised, and every pupil ought to do them with enthusiasm, inflating the lungs to their fullest capacity and emptying them to the last possible cubic inch, always inhaling through the nose.

Fresh air. The kind of air that we breathe is very important. Whether it be warm, cool, moist, or dry is of less importance than that it be fresh. Outdoor air is the freshest. Country air is better than that of the city, but even the outdoor air of the city is invigorating. Those who are much in the open air have better health and, as a rule, live longer than those who are shut in most of the time.

Warm air, especially in the house, is depressing, and cool air is stimulating. Therefore it is important to keep down the temperature of schoolrooms and living-rooms whenever possible. A temperature of from 66° to 68° F. is considered standard, but lower temperatures will be found distinctly beneficial to those who can become accustomed to them.

Dryness of the air is a matter of climate and is not subject to man's control, except in the house, where it can be regulated only imperfectly. Indoor air in summer is frequently too moist, and in winter is probably often too dry. In summer there is no convenient way of drying house air which is too moist, and it is difficult to moisten sufficiently the dry air of a house in winter. Steam and hot-water heating systems make no provision for moistening the air, and hot-air furnaces do so only imperfectly. Most of the latter have pans of water in their air passages, but the moisture which they furnish is entirely inadequate. The question of controlling the moisture in house air is far from a satisfactory solution.

Ventilation. A room in which the air is not in motion is not well ventilated. Ventilation can best be obtained through the windows. Good ventilation can be secured by keeping two windows open, one at the top and the other at the bottom. This works best if the windows are on opposite sides of the room. If there is only one window, it should be opened at both top and bottom. The width of the openings will depend upon the weather. In cold weather good use may be made of a window board. This is a narrow board which is fitted to the inside of the

window casing, at the bottom, two or three inches from the window. When the window is raised at the bottom, the cold air which enters is deflected upward. The opening between the two sashes furnishes a way for some of the heated air to escape. A more easily constructed board, though less effective, is one that is placed beneath the lower sash. As this does not fit tightly, air enters around it; ventilation is also provided by the opening between the sashes, as with the other board. A row of half-inch or three-quarter-inch holes in this board will add greatly to its efficiency.

In cool weather an open fire, which keeps a current of air moving up the chimney, furnishes excellent ventilation. In warm weather electric fans are of great value, especially in theaters, assembly halls, and other places where the air becomes stagnant.

QUESTIONS

1. What things are most essential to human life? Which of these is the most important? Why?

2. About what important matter are people usually very heedless? Explain.

3. What is shallow breathing? How may it lead to harm?

4. Why is muscular exercise not the correct remedy for insufficient breathing?

5. What is the best remedy? How should it be put into practice?

6. How may pupils profit by the exercises provided in the schools?

7. What kind of air is the best to breathe? Where is such air found? What influence does it have upon the health?

8. Why should living-rooms be kept cool? What is the proper temperature for houses and schoolrooms?

9. When is the air in houses often too moist? When is it too dry?

10. In what respect do ordinary heating systems for houses fail?

11. When is a room not well ventilated? Explain how good ventilation may be obtained.

12. Describe a window board and its use.

13. Why is an open fire a good ventilator?

14. Where are electric fans of great value?

CHAPTER IV

EATING

The guide to eating. Appetite ought to be the best guide to eating, indicating when to eat, what to eat, and how much. It may have been a reliable guide when foods were simpler and there were fewer kinds to choose from, but it cannot be depended upon now. There are too many varieties of food and too many attractive ways of preparing it. The appetite should not be ignored, however, but must itself be guided.

What to eat. Before we can make a wise selection of food, we must know what the body requires, what substances various foods contain, and their digestibility. All of the things which the body requires may be placed in four groups: proteins, carbohydrates (starches and sugars), fats, and a group consisting of water, mineral salts, and vegetable acids. The proteins are used for growth and repair; the carbohydrates and fats (which are called fuel foods), to supply heat and energy. Proteins may also be used for the latter purpose. To maintain life and to keep the body in condition to resist disease, all of these kinds of food are necessary.

The various articles of diet with which we are familiar contain some of these food principles. For example, lean meat is rich in proteins and contains also small

amounts of fat and mineral salts. Other foods which contain a considerable amount of proteins are fish, eggs, milk, cheese, beans, peas, oatmeal, and wheat flour. The four last mentioned, besides containing proteins, are rich in starch (carbohydrate) and also contain small amounts of fat and mineral. Other foods that are rich in starch are rice, Indian meal, rye flour, and potatoes. Sugar (carbohydrate) is contained in many kinds of fruit. Fat or oil occurs in most of the above-mentioned kinds of food and is especially abundant in butter and pork; it also occurs in nuts, cocoa, and chocolate. Minerals and vegetable acids are found in fruits and vegetables generally.

There is no single article of diet which contains everything that the human body needs (cow's milk is the nearest to a perfect food); therefore, for a perfectly balanced meal, it is necessary to combine several kinds of food. There are, however, several familiar combinations of two kinds which are excellent, though not ideal, — for example, bread and butter, crackers and cheese, pork and beans, and meat and potato.

Although a person may live upon a purely vegetable diet, proper nourishment cannot be obtained from vegetables alone. There is no combination of vegetables which will furnish enough proteins to the body without adding too much of the carbohydrates. This calls for more work from the digestive organs than is consistent with health. If, however, butter, eggs, and milk are added to vegetables, a well-balanced and nutritious diet may be obtained without the use of meat. Such a diet is better

for adults than for children, whose protein requirements are greater. In childhood and in youth abundant nutrition is necessary, and it is very important to have enough protein, as any deficiency in this important food principle reduces the power to resist disease.

Individuals differ greatly in their ability to digest food. Therefore what would be a perfect combination of food for one might be unsuitable for another. A strong, healthy man, living an active, outdoor life, ought to be able to digest any kind of food; but the same is not true of one who sits at a desk all day, working principally with his brain. For the former the problem of a suitable diet is simple; for the latter it is more difficult. The brain worker usually requires easily digestible foods, though this is not always true. Each must work out his own problem. There are no specific rules, but it is well in practice to avoid those things which you have found by repeated trials to disagree with you. Hot bread, fried meats, baked beans, and pastry usually offer difficulties to a weak digestion; while raw milk, soft-boiled eggs, lamb, tripe, rice, sago, tapioca, and barley are among those which are most easily digestible.

Rules for eating. 1. Above everything else learn *to eat slowly*. Chew every mouthful until it is creamy and you cannot help swallowing it. Never swallow a lump. All of the food should be broken up by the teeth and made so fine that the saliva can penetrate to every part. Do not moisten the food with anything but saliva. With a view to future success, the ambitious young person cannot use his time more profitably than in chewing his

food well. It means longer life, greater happiness, and more prosperity. Examples of bad methods of eating are furnished by pupils in high schools, who run home at noon, eat as fast as possible, and hurry back to school. A lunch of bread and butter, carried to school and eaten properly, will supply more nourishment to the body than a whole dinner eaten in a hurry at home. It is not the amount eaten, but the amount digested and assimilated, that nourishes the body.

2. *Do not overeat.* Stop eating when you have had enough. Poisonous substances are formed from food that is not digested. If you eat slowly and chew your food thoroughly, there will be little danger of overeating. It is usually people who eat too fast who eat too much.

3. *Eat regularly*, that is, at regular intervals. Five hours ought to elapse between meals, in order that the stomach may have a sufficient rest after its work is done.

4. *Do not eat unless you are really hungry.* If there is no desire for food, the stomach is not ready for it. Omitting a meal will do no harm. Many people eat only two meals a day, and thrive. Eating three times a day is merely a habit.

5. *Do not eat when very tired.* Rest a little while first. Fatigue is a general condition and affects the whole body, including the stomach.

Indigestion. Americans are called a nation of dyspeptics. We do everything in a hurry, including our eating. The most common cause of indigestion is hurried eating. A young, vigorous person may eat improperly for a long time — even for years — without showing ill effects, but

in time the result is sure to come, and indigestion is something we cannot afford to have at any time of life. It means malnutrition, impaired vigor, and susceptibility to disease. In this condition many people wrongly resort to patent medicines, which can do no good. The only way to bring about a permanent cure is to find out the cause and remove it. This usually means to adopt right methods of eating, and to continue in them for a long time, for it is not reasonable to expect in a short time to make amends for a long course of wrongdoing.

Besides wrong methods of eating there are some other causes of indigestion, such as excitement, worry, anger, and eyestrain. Any nervous strain acts directly upon the digestion. Therefore it is well worth while, early in life, to cultivate an even and unruffled disposition.

If indigestion does not yield to the above method of treatment within a reasonable time, a physician should be consulted, because the indigestion may be caused by some other more serious ailment.

Lunches between meals are unnecessary and often injurious, and should be avoided. Even the eating of fruit at such times is harmful. It gives the stomach no time to rest.

Fruits. Fruits are easily digested and, although not highly nutritious, are valuable as food. They contain acids and salts that are needed, and also give bulk to the contents of the stomach and intestines, which is an aid to the healthy action of these organs. They may properly be eaten before breakfast, and may form a part of any regular meal. Bananas contain more nutriment

than other kinds of fruit and are easily digested if they are ripe and are chewed properly.

Sugar. Sugar is an important factor in a normal diet. It is acted upon immediately by the saliva, and is rendered fit for assimilation more quickly than any other food. No other kind of food satisfies hunger so quickly. Hence anything sweet should be eaten in the latter part of a meal, as it takes away the appetite for other foods. The prevailing custom of placing a sweet dessert at the end of a hearty meal is accordingly hygienic. Good candy makes an excellent dessert, but the practice of eating candy between meals is wrong, and making a whole meal of it is very injurious.

Raw foods. Cooking greatly enriches the flavors of some foods, such as meat, fish, eggs, etc., and is essential to the digestibility of others, such as cereals, potatoes, and unripe fruits. Cooking, however, robs some foods of small but very important parts called vitamins. These vitamins, although not perfectly understood, are believed to be essential to health. Their absence results in the so-called deficiency diseases,[1] which are characterized by a great weakness of the muscles, especially those of the heart. Vitamins occur in grains, nuts, milk, and eggs, and in many fresh fruits and vegetables. Although present in the kernels of wheat, rye, and rice, they are in the outer layers, which are usually removed by the modern methods of milling wheat and rye and of polishing rice. They are entirely lacking in canned foods, being destroyed by the high temperatures and the prolonged heating to which they are subjected; and they are partly

[1] Such as scurvy and beriberi.

destroyed in milk by the moderate heat of pasteurization. Since cooking destroys vitamins, wholly or in part, it is important that raw foods, such as lettuce, celery, tomatoes, fruits, nuts, and milk should form a part of the daily diet.

Condiments. Mustard, red pepper, horse-radish, and the like are unnecessary and are not good for young people. They irritate the stomach and dull the appetite for simpler foods. Older persons, however, sometimes seem to need them to stimulate the appetite and the digestion. Salt is found in nearly every part of the body. Although a condiment, it is an important part of our food, and its absence results in a serious disturbance of the digestion and of the allied processes.

Effect of diet upon the action of the intestines. It takes about twelve hours for the food to pass from one end of the small intestine to the other. By the time it reaches the lower end, all of the digestion, and most of the absorption into the blood, has been completed. The greater part of that which enters the large intestine is indigestible. Its journey through the large intestine is at a slower rate. The absorption here is mostly of water, reducing the contents to a more solid texture. While there is nothing in this indigestible remainder that is of itself harmful, it is subject to a bacterial action which produces substances that are harmful if absorbed into the general system. Therefore it is imperative that the passage of such products be not unnecessarily delayed. In fact, it is just as important that a part of the contents of the large intestine should pass from the body daily as

that we should take our daily food. And just as we have regular times for taking our meals, so should we have a regular time for emptying the large intestine.

Failure to form this habit usually brings on *constipation*, which often leads to very injurious results. Its all-too-common prevalence may usually be traced to one or more of three causes: neglect to form a very important habit, a sedentary life, and the eating of foods that are too highly refined. The importance of the first of these has already been urged. As to the second, it is enough to say that exercise and bodily activity hasten the movement of the food through the stomach and the intestines, and that experience shows that people who lead active lives are much less troubled with constipation than those whose occupations are largely sedentary. A careful consideration of the third will prove profitable. As already stated, it is principally the indigestible part of the food which makes its way into the large intestine, and which must be discharged from that organ. If there were no indigestible part, there would be nothing to be discharged, and the large intestine, with nothing to do, would lose its power to act. This cannot quite happen, for all of our foods contain something that is indigestible; but it does take place to a degree. Many modern foods have had so much of that which is coarse and indigestible taken out, that the amount which enters the large intestine is measurably reduced in volume. Wheat, our most important cereal, may be cited as an example. In the preparation of ordinary white flour much is removed that is valuable for food as well as important to the healthy

action of the intestines. Graham flour, which contains everything that the wheat contained, is more valuable for daily use. Its substitution for white flour cannot be too strongly urged. All that has been said about wheat is true to a greater or less degree of other cereals; and it may be stated in this connection that many vegetables are a valuable addition to our diet not so much for the nutriment they contain as for their stimulating effect upon the stomach and intestines.

QUESTIONS

1. In what ways ought the appetite to guide the eating? Why can it not be depended upon?
2. What knowledge must we have in order to make a wise selection of food?
3. What four kinds of food are necessary?
4. Name several kinds of food that contain a considerable amount of protein.
5. Name several kinds of food that are rich in starch.
6. In what food is sugar found?
7. In what foods is fat abundant?
8. In what foods do minerals and vegetable acids occur?
9. What single article of diet is most nearly a perfect food?
10. Name some excellent combinations of two kinds of food.
11. What is the objection to a purely vegetable diet?
12. How may a well-balanced diet be obtained without the use of meat?
13. Why ought children to have plenty of protein?

14. Explain why that which would be a perfect diet for one person might be unsuitable for another.

15. Name several kinds of food which are considered hard to digest.

16. Give several examples of foods which are considered easy to digest.

17. What is the most important rule in eating?

18. Explain how chewing the food well can have anything to do with future success.

19. What is the objection to going home to luncheon?

20. Explain how a luncheon brought to school may be better than a dinner eaten at home.

21. What harm is there in overeating?

22. How many hours apart ought our meals to be? Why?

23. Why is it not well to eat when one is not hungry or when one is very tired?

24. What is the most common cause of indigestion?

25. What is the only rational way to bring about a cure? What does this mean?

26. Name some other causes of indigestion.

27. Why are luncheons between meals injurious?

28. State two reasons why fruits are valuable for food. What is the best time to eat them?

29. Why is sugar important? In what part of a meal do sweets belong? Why?

30. When may candy be eaten? Why is it injurious to eat candy before meals?

31. Name several condiments. Why are they not good for young people?

32. What harm would result if no salt were used in food?

33. How long does it take food to pass through the small intestine? What takes place in that process?

34. What part of the food enters the large intestine? What harm may be caused if it stays there too long?

35. What other harm may be produced from the same delay? How else may it be caused? Of what value is exercise in this connection?

36. What would be the result if there were no indigestible part in food?

37. Give two reasons why Graham flour is better for us than white flour.

38. What is the chief value of many vegetables?

CHAPTER V

DRINKING

Water and the human body. Sixty-five per cent of the human body is water. Most people do not drink water enough. Eight or ten glasses a day are not too many. The advantages of drinking water freely are as follows:

1. *It improves the health* by washing the impurities out of the blood. Pure water enters the blood, dissolves the products of oxidation, and passes out through the skin and the kidneys.

2. *It improves the looks* by keeping the skin smooth and by increasing the flow of blood in the little vessels at the surface.

The only persons who may not be benefited by drinking a large amount of water are those with weak hearts. In such cases the increase in the amount of blood may give the heart too much work to do.

Drinking at meals. Although opinions differ as to the effects of drinking water at meals, recent experiments tend to show that it is a good practice, which improves both the appetite and the digestion. Some authorities recommend a glass or two, and others as much as one pleases. Care should be taken not to wash the food down. It is not well to take any liquid into the mouth

while it contains food, as this favors fast eating and allows lumps to be swallowed.

Drinking at other times. Do not confine your drinking to mealtimes. Drink before breakfast, between meals, and in the evening, but not later than half an hour before bedtime; cold water in the stomach may prevent sleep.

Ice water. Even if pure, ice water should be taken sparingly. It chills and sometimes injures the stomach. Do not get into the habit of drinking it. It may not be pure; disease germs are not always killed by freezing.

Hot water. While hot water is sometimes a good remedy for indigestion, headache, or chill, it will lose its effect if taken too often. It should never take the place of cold water as a beverage.

Soda water. There is nothing harmful in soda water and similar beverages if they are made of pure fruit juices; but they are not always so made, and they contain so much sugar that they may easily interfere with the appetite and the digestion, especially since they are usually taken between meals.

Tea, coffee, and cocoa. Tea and coffee differ widely in appearance, taste, and origin, but are very similar in their effects upon the human system. The caffeine of coffee and the theine of tea are chemically identical. Both tea and coffee contain tannin, but there is more in tea than in coffee. The amount of tannin in a cup of tea depends largely upon the length of time the tea is in contact with boiling water. The best way to prepare tea is to pour boiling water over tea leaves and

allow this to stand a few minutes. Tea that has been boiled for any considerable time is not fit to drink. Both tea and coffee stimulate the nervous system and the heart, and are injurious if used immoderately. One cup of either at a meal is enough for an adult, and that should not be too strong. It makes little difference whether it be taken "straight" or with sugar and cream or milk. In addition to their irritating effects upon the nerves, both tea and coffee hinder the action of the saliva and tend to disturb the digestion. On this account they must be taken slowly enough to become thoroughly mixed with the saliva before being swallowed, and for the same reason they are unsuitable for persons with weak digestions. Even weak tea and coffee are unfit for children.

Cocoa resembles tea and coffee in some ways. It is a mild stimulant, but is less exciting to the nervous system. It is more easily digested and has a much higher food value. It can be safely recommended as a refreshing and stimulating beverage.

Milk. Milk contains nearly everything that the body needs, being deficient only in carbohydrates. It is very digestible, making the work of the stomach easy, and it is free from the harmful products which are a burden to the liver and the kidneys. Raw (uncooked) milk is the best. Boiling robs it of some of its most valuable qualities, such as easy digestibility and the power of destroying bacteria in the intestines. Pasteurization, which is produced by keeping milk between 140° and 150° F. for thirty minutes, destroys the harmful bacteria and avoids

much of the injury caused by boiling. Bacteria multiply rapidly in milk, especially if it is warm. Therefore it is imperative that it be received strictly fresh, kept cool, and used soon after delivery. Even Pasteurization does not prevent bacteria from developing later.

Milk, like all other beverages except water, must be taken slowly, because it contains sugar, which requires saliva to digest it. There is also another reason. Milk is curdled immediately upon its entrance into the stomach. If it is taken slowly, it will be curdled in many small lumps, all of which can be easily reached by the digestive juices; but if it is taken rapidly, it will curdle in one mass, which will greatly increase the difficulty of digestion. Milk is a natural food of the young and by nature's methods cannot be obtained otherwise than slowly.

QUESTIONS

1. What per cent of the human body is water?
2. How much water ought one to drink in a day?
3. How may drinking plenty of water improve the health? Explain.
4. How may it improve the looks?
5. Who should avoid drinking much water? Why?
6. What is the effect of drinking at meals?
7. What precaution is necessary? Why?
8. At what other times may we drink?
9. What objection is there to drinking ice water? How can it be impure?
10. For what is hot water a remedy?

11. Find out how soda water is prepared. What is sometimes substituted for pure fruit juices?

12. What harm may come from drinking soda water too often? Why?

13. In what way are tea and coffee alike?

14. What is the name of the active principle of tea? of coffee? How do they compare?

15. What else do they contain?

16. What is the best way to prepare tea? Why is tea that has been boiled for some time unfit to drink?

17. What are the physiological effects of tea and coffee?

18. When do they become injurious?

19. How may they interfere with the digestion? How may this be prevented?

20. Are they ever fit for children?

21. How does cocoa compare with tea and coffee in effect upon the nervous system? in digestibility? in food value?

22. Why is milk not a perfect food?

23. Why does it make the work of the stomach easy? of the liver and kidneys?

24. What is the best milk? Why?

25. What is meant by Pasteurization? What is the purpose of this?

26. Why should milk be received fresh and kept cool?

27. Why must milk be taken slowly? What is another reason?

28. Is milk taken quickly or slowly by nature's methods?

CHAPTER VI

SLEEP

Sleep a necessity. Total loss of sleep would in a short time produce death. Even its loss for a single night is shown in the pale face and dull eyes. Sleep is a necessity because in our waking hours the products of fatigue, both muscular and mental, accumulate; they are formed faster than they can be liberated from the body. During sleep the reverse is true; they are removed faster than they are formed, until the two processes balance each other. No more sleep is needed; the mind is clear and the body is refreshed.

The best conditions. Night is the best time for sleep, because it is dark, quiet, and cool. The brain is undisturbed. Noise and light stimulate the brain to activity and prevent sleep; so does the bodily discomfort which is caused by heat. Sleepiness may be caused by a full stomach, because the blood is called away from the brain, but sleep will not be so sound, nor so refreshing, if the stomach is at work.

Since oxidation plays an important part in ridding the body of accumulated poisons, ventilation is very important. It is impossible to get too much fresh air, but care should be taken not to have a current of air blowing in the face, nor too strong a draft across the bed, because in

sleep the resisting power of the body is greatly diminished.

Sleep is soundest and most refreshing around midnight; therefore it is best to go to bed early, — ten o'clock at the latest.

Length of sleep. There are great individual differences in regard to the amount of sleep required. As a rule young persons require more than those who are older, but each must find out for himself just what his requirements are. The essential thing is to wake feeling perfectly rested and restored, both in body and in mind. There are notable examples of men who have found five hours sufficient, but this is unusual. The ordinary requirement is from seven to nine hours. If sleep is lost, it must be made up at the earliest opportunity.

Too much sleep causes a feeling of depression and is injurious. Therefore it is best to rise promptly, as soon as the body is fairly awake.

Insomnia. Young persons are not often troubled with insomnia. If, however, there is a tendency to lie awake at night, some steps should be taken to bring about normal sleep. The following suggestions, if heeded, will prove to be of value. Eat a light supper, not later than six o'clock, and go to bed early in a cool, well-ventilated room from which all light and noise are excluded. Avoid mental work and the reading of exciting stories, especially just before retiring. Do not read in bed. Put out of your mind all irritating and troublesome thoughts or, better, try not to think at all. Walking or riding in the open air often makes one sleepy, and a warm bath may produce the same effect.

Bedclothing. During sleep there is a general slowing down of the vital processes (such as respiration, the beating of the heart, etc.), and hence a general lowering of the vitality and of the power of resistance to cold and exposure. Therefore it is necessary in sleep to keep the body more warmly covered than when awake and active. On the other hand, care should be taken that the covering is not too warm, and especially that it is not too heavy. Heavy clothing is very fatiguing. Probably the bed-covering which combines the greatest warmth with the lightest weight is a down quilt, but for general use there is nothing better than woolen blankets. Two thin blankets are warmer than a single thick one of the same weight, owing to the air space between. The feather bed is considered unhygienic and has been almost entirely replaced by the mattress. The pillow should be small; a large pillow holds the head in an unnatural position and, by causing the neck to bend, hinders the free circulation of the blood. The more nearly straight and horizontal the body is in sleep, the more perfect will be the relaxation and rest.

Bedclothing should be thoroughly aired every morning at an open window.

QUESTIONS

1. Why is sleep necessary? Explain fully.
2. Why is the night the best time for sleep?
3. Why do noise, light, and heat prevent sleep?
4. Why is sleep not refreshing when the stomach is full?

5. Why is ventilation important during sleep?

6. Why should one avoid sleeping in a draft?

7. What is the advantage of going to bed early?

8. How should one feel after having the right amount of sleep?

9. How many hours are usually required?

10. Why is it best to rise as soon as one is fully awake?

11. What should be done to produce normal sleep if there is a tendency to lie awake at night?

12. Why is it necessary to keep the body warmly covered while asleep?

13. Why is it important to avoid too heavy covering?

14. What is the best covering for general use?

15. Why are two thin blankets warmer than one thick one of the same weight?

16. Why should the pillow be small?

17. What is the best position for the body in sleep?

18. How should bedclothing be aired?

CHAPTER VII

EXERCISE

Effect of exercise upon the general circulation. Few people realize the important part that exercise plays in the circulation of the blood through the body. It is generally understood that the heart is a pump which is responsible for all the movements of the blood in the arteries, veins, and capillaries. This is not the whole truth, for the muscles and veins, with the valves of the latter, form a pumping system that is second in efficiency only to the heart itself. This system is especially valuable in helping the heart to move the blood back again to the chest, against gravity (after its long journey down to the feet) and through the resisting capillaries.

Every time a muscle is contracted, or hardened, as in walking, the blood is forced out of the veins passing through it. This blood is forced upward toward the heart, for it cannot go back to the feet on account of the valves. When the muscle is relaxed, the pressure is reduced, and blood again flows into that part of the vein. But it must come from below, not from above, as the valves allow the blood in the veins to move only toward the heart. The importance of this muscular contraction to the general circulation must be appreciated when it is remembered that the blood is forced along in the veins

not only by the muscles of the legs but by nearly all of the more than five hundred muscles of the body.

Why the muscles get tired. Everything we do is at the expense of energy. This energy comes from oxidation that takes place within. It takes energy to sit, to stand, or to move a muscle. We are using up energy every moment we live. Some substances are being consumed; others are being formed. It is necessary for the former to be renewed and for the latter to be removed. Both of these changes are effected by the blood. It must bring the new material and carry away the products of oxidation, which are now worse than useless. They must be taken to the lungs, the skin, and the kidneys to be thrown from the body. Suppose that neither of these acts is performed, or that they are done imperfectly. The condition in the muscle is abhorrent. The nerves of that region enter a complaint. There is an uncomfortable feeling. It increases to a pain. What is the matter? Two things: the muscle is out of food and is overloaded with carbon dioxide and other products of oxidation, which are irritating the nerves. What must be done to bring relief? That depends upon how the trouble was brought about. If it was caused by excessive use of the muscle, the remedy is to rest until the blood has removed the wastes and supplied the wants; if it was caused by keeping a muscle contracted too long at a time, as sometimes occurs when one stands too long in one position, a little exercise will hasten the recovery, by squeezing out the stagnant blood and bringing in the new. This explains why walking is less

tiresome than standing, and why moderate exercise is usually restful. Violent exercise is tiring, because waste products are produced faster than they can be removed, and because materials are consumed faster than they can be replaced.

The effect of exercise upon the heart. Violent exercise requires rapid oxidation. To accomplish this the breathing is quickened and the blood is forced rapidly through the lungs. The contracting muscles bring the blood in large quantities to the heart, which in turn must force it through the lungs, back again to itself, and then out over the body again. Such unusual labor is of no benefit to the heart and, if continued too long, may result in positive injury.

Moderate exercise quickens slightly the action of the heart, but does not increase its load to the point of injury, if at all, because the muscular contraction, gently forcing the blood along in the veins, reduces the pressure against which the heart must work.

In the absence of exercise the heart has all the work of the circulation to perform. Violent exercise overworks the heart; moderate exercise lightens its task. Therefore it may be concluded that with moderate exercise taken regularly the heart will be kept at its best. Experience proves this conclusion to be correct.

The best exercise. Opinions differ as to what is specifically the best form of exercise, but as to its general characteristics there can be no disagreement. To produce the best results, exercise ought to be in the open air, to bring a large number of muscles into play, and to be

agreeable enough to take the mind from other things. It should be stopped before the point of fatigue is reached. Do not exercise violently after a hearty meal. Do not begin exercise when tired.

QUESTIONS

1. What is the function of the heart? of the arteries? of the veins? of the capillaries? (Find the answers in the Appendix.)
2. Why is it easier for the heart to send blood to the feet through the arteries than to draw it back again through the veins?
3. Explain how the action of the muscles assists the heart.
4. What are the valves? How do they act?
5. What is energy? Where does the body get its energy?
6. What is the source of the materials consumed?
7. What becomes of the products formed?
8. Why do tired muscles ache?
9. What brings relief to tired muscles? Why?
10. Why is walking less tiresome than standing?
11. Why is violent exercise tiring?
12. What is the effect of violent exercise upon the heart? Explain.
13. Why is moderate exercise a benefit to the heart?
14. What is the effect of no exercise?
15. What are the characteristics of the best exercise?
16. When should exercise be stopped? Why?
17. When should exercise not be taken?

CHAPTER VIII

INFLUENCE OF THE MIND UPON HEALTH

Effects of sudden mental shock. A thought may cause the face to turn white or scarlet, may make the body cold or warm, may produce hunger or nausea. From sudden shock, black hair has been turned white in one night. Cases are recorded of those who have died of disappointment, of fright, and from other kinds of mental shock. Sudden death from such causes is rare, but, unfortunately, impaired health, gray hair, haggard looks, and premature old age are not.

Influence of the emotions. Philosophers long ago believed that the emotions strongly influenced the health. But this is the age of science, in which we do not depend upon indirect methods for proofs. We know that the mind dominates the body. We know what nerve centers are affected by the various strong emotions, what organs are controlled by them, and how the health is affected by an increase or decrease in the activities of these organs. The heart, arteries, kidneys, liver, pancreas, and stomach are especially susceptible to the influence of strong mental emotion, and many are the lives that are shortened in consequence. Not only does mental depression, due to care, worry, and sorrow, impair the efficiency of these and other organs, but it lets down the bars for the entrance of the bacteria of disease; for it is through

the efficiency of these organs that the body is able to defend itself against infections.

Mental attitudes that should be curbed by the will. Care, worry, and sorrow are often attributed to misfortune, and may be in a measure so caused; but frequently this notion is overemphasized, especially by those who are inclined to augment the ills of life. The assuming of heavy cares is largely optional, while worrying and sorrowing may be controlled by the will. It has been aptly said that there are two things we should not worry about, — those we can help and those we cannot. About the former there is no need to worry, and worrying about the latter is of no use. People who have the habit of worrying take refuge in the excuse that it is constitutional, — that it is their nature to worry. But this is a poor excuse, for we are all examples of the changes that can be wrought in the very nature of human beings by cultivation and effort. Many give way to mourning over the loss of friends to a degree that is injurious to the health and utterly destructive of happiness. A strong attempt should be made to throw off such an influence, for upon the living it has only harmful effects, and to those who have departed it can do no good.

Anger, envy, jealousy, and fear are in a class with the above-mentioned health depressants, and like them may be made subject to the will.

Mental attitudes that should be cultivated. Do not dwell upon your ills. Make a genuine effort to rise above the misfortunes of life. There are two sides to everything; form the habit of looking on the bright side.

Do not think too much about yourself. Cultivate an interest in matters outside. The world is full of beautiful things. Music, art, literature, and nature offer diversions from which you may have your choice.

Practice self-control. Begin at once with the little things. Make up your mind that you will not lose your temper whatever may happen. If you succeed in controlling yourself in small matters, you will soon be master of yourself.

Foster the health-giving qualities of cheerfulness, courage, and hope. That health and cheerfulness beget each other is proverbial. Care, worry, and sorrow cannot long remain in the presence of cheerfulness. Every organ of the body comes under its magic spell. It is a fountain of youth and health to its possessor and of happiness to his associates.

Have the courage to undertake anything, but beware of overdoing, for nature will not fail to exact a penalty.

Believe in yourself and in a beneficent Creator who has given you not only your existence but a body provided with every means to resist disease; for in this belief lies your hope in this world and in the future. If disease overtakes you, courage and hope are your best assets. Without them life is useless.

QUESTIONS

1. What effects are sometimes caused by sudden mental shock?
2. What organs are especially influenced by the emotions?
3. How may the action of the emotions lessen the power of the body to resist disease?

4. Why should a strong effort be made to throw off care, worry, and sorrow?

5. How do anger, envy, and fear affect the health? How may they be controlled?

6. How may we rise above misfortune?

7. How may the mind be diverted from thoughts that are depressing?

8. How may one become master of himself?

9. What are the qualities to be cultivated?

10. What effect has cheerfulness upon health?

11. Why should we avoid overdoing?

12. What is the foundation of hope?

13. What are the best assets in sickness?

CHAPTER IX

HYGIENE OF THE TEETH

The cause of decay. Our ancestors had larger and stronger teeth than we have. In each succeeding generation the teeth seem to be weaker and to require more of the dentist's care. This can probably be accounted for by the difference in food. Our predecessors were obliged to eat coarse foods, which required a much greater amount of chewing. The exercise of chewing insured a good blood and nerve supply to the teeth. With the present-day processes of grinding and cooking, foods require little chewing. Consequently the teeth are weaker. Moreover, much of the food, owing to its fineness, sticks to the teeth and between them, and, unless removed, becomes the home of the bacteria of decay. Few people realize that this is so. It is, however, true that bacteria in the mouth are universal, and the numbers are limited only by the amount of food clinging to the teeth. These bacteria are the cause of decay of the teeth themselves; hence the importance of removing the food which harbors them.

Importance of care of the teeth. There are great natural differences in teeth; but whether teeth be good or poor, they must not be neglected. Care will make up for many natural deficiencies. Following are some of the reasons why they should receive such care.

Neglected teeth look bad. Nothing injures the personal appearance more than bad teeth. Therefore everything possible ought to be done to make them look well.

They cause indigestion. Without good teeth the food cannot be properly chewed. Insufficient chewing leads to indigestion, and the body, being poorly nourished, is more susceptible to disease.

Their odor is offensive. Decaying teeth cause a bad breath, which is a great hindrance in any kind of work where one has to associate with other people.

They invite disease. If the teeth are rough and coated with food, the bacteria of disease lodge on them and multiply, and from this source invade the body.

They poison the system. The products of decay are poisonous and, when absorbed, lead to many distressing and perplexing symptoms. This is especially true when there are sacs of pus at the roots of the teeth, which is often the case where teeth are badly decayed.

They cause toothache. All toothache and most cases of facial neuralgia are due to cavities in the teeth. If the small cavities are attended to regularly and filled as soon as discovered, all trouble from this source will be avoided.

They are finally extracted. Neglected teeth finally become unserviceable, a constant source of suffering and a menace to health. It is necessary to have them removed and replaced by artificial ones, which are in no way to be compared to those which nature bestowed.

Prevention of decay. *Visit the dentist.* All children should visit the dentist at least once a year, to have deformities remedied and cavities filled. By having the

teeth examined two or three times a year the cavities can be filled while they are very small. To fill a small cavity is inexpensive and does not hurt. Teeth that are crowded are much more likely to decay than those that are well spaced, and irregular teeth are unsightly. Such deformities may be easily corrected if attended to before the age of twenty-one.

Keep the teeth clean. For failure to give personal care to the teeth there is no excuse. They should be made strong by use, that is, by chewing every mouthful of food thoroughly. They should also be cleaned carefully and frequently; clean teeth do not decay. Form the habit of brushing the teeth night and morning at least. They ought to be brushed after every meal, but this is not always convenient.

In brushing it is not sufficient to move the brush back and forth across the teeth; it should be moved up and down as well, to remove the food which is between them. For this purpose the daily use of dental floss is also highly recommended. This is a soft waxed thread which can be obtained at any drug store. Drawing it between the teeth will remove particles of food which cannot be reached by the brush.

The brush. The bristles of the brush should be in tufts. They should be stiff for adults (but not so stiff as to make the gums bleed) and softer for children. A brush should be thrown away when it becomes worn with use. Such a brush will not clean the teeth properly, and when flattened down is likely to loosen the edge of the gums from the teeth.

Powders and pastes. Tooth powders and pastes are constructed in accordance with scientific principles. They are useful for cleaning and polishing the teeth, and they hinder the growth of bacteria in the mouth. No one need hesitate to adopt any of the well-known kinds. Pastes are as good as powders and much more convenient to use. One of these should be applied at least once a day. Liquid preparations are pleasant to use and have some excellent qualities, but they cannot take the place of powder or paste. A teaspoonful of salt in a glass of water makes an excellent mouth cleanser and gum hardener. It was in use long before tooth powders and pastes were invented, and is still recommended by the best dentists.

QUESTIONS

1. State two reasons why our teeth decay more quickly than those of people who lived a few generations ago.

2. What are bacteria?

3. How important are the teeth to personal appearance?

4. Explain how bad teeth cause indigestion.

5. How do they invite disease?

6. Why is a bad breath a hindrance in business?

7. What is another name for pus? Is pus poisonous? Try to find out what are some of the distressing symptoms which are believed to be caused by the absorption of pus.

8. How can toothache be prevented?

9. How do false teeth compare with real ones in appearance? in usefulness?

10. How often should children visit the dentist?

11. Why are crowded teeth more likely to decay than those that are well spaced?

12. Where are cavities usually found?

13. Why are deformities of the teeth more easily corrected in young people than in older people?

14. What two things should be done by everyone to preserve the teeth?

15. How often should the teeth be brushed? Why is after meals the most logical time?

16. How should the brush be moved in cleaning the teeth? Why?

17. What is dental floss? How is it used?

18. Why should the bristles of a toothbrush be in tufts?

19. In what ways are tooth powders and pastes useful?

20. How do liquid preparations compare with powders and pastes?

21. How often should powder or paste be used?

22. What is the value of salt and water as a mouth wash? In what proportions should the salt and water be used?

CHAPTER X

THE SKIN

Functions of the skin. *The skin is a protective covering* for the body, guarding it against mechanical injury and also against bacteria.

It is a sensory organ, containing the nerves of touch. The skin is so well provided with these nerves that no portion of skin as large as the point of a pin can be found without them. Much of our knowledge depends upon this sense. With the skin removed, all sense of touch is gone, and in its place remains only the sensation of pain, which conveys no idea of any of the properties of our surroundings.

It is a heat regulator for the body. It is largely through the action of the skin that the body is kept at the constant temperature of 98.4° F. The excess heat is disposed of by radiation from the skin and by perspiration. These two processes are in operation all the time, according to the bodily needs. When a great excess of heat is generated, as in exercising, blood is sent to the skin, where its heat is rapidly radiated off if not hindered by too much clothing. At the same time the pores of the skin open and allow the millions of sweat glands to discharge perspiration. This perspiration cools the body in two ways: by bringing heat out from the interior, and by evaporation.

The latter is the more effective. Evaporation always produces cooling; and the more rapid the evaporation, the more rapid the cooling. In muggy weather we have a feeling of great bodily discomfort, almost of suffocation, because the air is too moist to take up the perspiration. There is almost no evaporation. The perspiration remains on the surface of the body, blocking the pores. In hot, dry weather there is less discomfort, because the perspiration evaporates. The same is true if there is a breeze or a draft. Air in motion takes up moisture rapidly; even the hot air driven against the face by a fan feels cool.

On the other hand, if the body is exposed to cold, the blood leaves the surface, and the pores close, to prevent a chilling of the body and a lowering of the temperature. Upon the ability of the skin to act quickly and effectively depends the power to resist taking cold.

It is an excretory organ. The normal amount of perspiration which is given out is from a quart to a quart and a half daily. This is taken out of the blood by the sweat glands. It consists of water and waste products whose retention in the body would be harmful. A coat of varnish applied all over the body would cause death in a short time.

Bathing. Dried sweat and oil, together with dust, dirt, and flakes of dead skin, quickly accumulate upon the surface of the body. If not removed, they tend to clog the pores and interfere with the work of the skin. Frequent baths will prevent this and will keep the skin in a vigorous condition. A frequent change of underclothing must be made if the body is to be kept free from offensive odors.

The warm bath (also called the neutral bath). A bath should be taken at least once a week with soap and warm water (90°–98°F.), to cleanse the skin. The best time is just before retiring, as warm baths are soothing to the nerves and induce sleep. They are also good after exercise, but should be finished with water considerably cooler if the bather intends to go out of doors. This is to close the pores and prevent taking cold. Too many warm baths are weakening and hurt the digestion.

The cold bath (65° F. or below). There are several kinds of cold baths: the sea bath, the tub bath, the shower bath, the sponge bath, and the hand bath. The sea and tub baths are the most severe, and in cold weather should be taken in the least possible time, — just a dip. The shower is the best, as it produces the right effect without taking too much heat from the body. The sponge and hand baths are excellent and are within the reach of all. Soap is not necessary. It is well to begin with water not too cold. Water from the cold faucet in summer is about right for a beginner. Experienced bathers prefer it much colder. The best time is immediately after rising in the morning. For a tub bath the water should be drawn the night before, to avoid waiting.

After bathing, rub the skin vigorously with a coarse towel. This should bring the blood to the surface freely, producing a redness of skin and a feeling of warmth. If a favorable reaction is not obtained after a few trials, cold baths should be stopped.

The effects of cold baths are felt immediately. The nervous system is stimulated, and through the nervous

system all the organs are toned up. Cold baths also make the skin hardy and tend to prevent colds.

A cold bath may be taken before breakfast, but as a rule one ought not to bathe just before eating or within an hour and a half after, as a bath draws the blood to the surface of the body and away from the stomach, where it is needed at that time.

The air bath. The cold-air bath is an excellent substitute for the cold-water bath, and is preferred by many, especially by those who find the latter too severe. It is taken by exercising five or ten minutes, while naked, in a cool room, or by rubbing the skin vigorously with a brush or with a coarse towel. The effects are milder than those of the cold-water bath, but are of the same kind. The body is stimulated and the skin becomes accustomed to cold air, which is of great value in avoiding colds.

The Turkish bath is a hot-air bath. It thoroughly cleanses the skin, even removing the outer layers of dead skin. It is good for rheumatism, sore muscles, stiff joints, and to break up a cold.

Swimming. A swimming bath has two advantages over other forms of cold baths, — enjoyment and exercise. The common prejudice against swimming in fresh water is probably due to the fact that lake and river water is usually warm in midsummer, and warm baths are weakening, especially if frequent and prolonged.

Sea bathing, if properly regulated, is very beneficial, but the practice of staying in a long time is harmful. From ten to twenty minutes is enough when the water is cold. To remain in the water until the teeth are

chattering, the lips blue, and the fingers white is highly injurious. And the practice of entering the water slowly, inch by inch, fearing to get wet, and shrinking from the cold can only produce bad effects, as it drives the blood to the head. Anyone who has not the courage to plunge in at once had better stay out. The best way to enter, although it is not always practicable, is to plunge in head first. It is all right to go in when warm, but not when sweating. The best time for sea bathing is in the morning, but in many places this is not practicable on account of the tide. A sun bath afterwards is very beneficial.

Washing the face. The face ought to be washed with soap and warm water every night before going to bed. Do not neglect the neck and ears. In the morning wash the face with cold water, without soap. Cold water improves the complexion by stimulating the circulation of the blood in the skin, and also tones up the elastic tissue, which makes the skin smooth. Hot water makes the skin pale, rough, and flabby.

Care of the hands. The hands ought to be washed with soap and water before eating, and as many other times a day as they need it. It is especially important to wash them before each meal, to prevent introducing bacteria into the mouth. Keep the nails clean; dirty nails are unsightly and are sure to harbor harmful bacteria. Do not clean them with the point of a knife or with any sharp-edged instrument. This roughens the nails and the skin beneath, and makes them collect dirt more rapidly. The cleaning may be done with a pointed stick which has been moistened, or with a nailbrush with soft bristles.

Keep the skin pushed back at the base of the nails, to prevent hangnails. This may be done with a blunt stick or with a towel, but always when the hand is moist. Sticks of orange wood suitable for cleaning the nails and for pushing back the cuticle can be bought at a drug store for a small sum. Do not scrape the nails. Do not bite them. Cut or file them in a curve; it is easier to keep them clean if they are short on the sides.

Soap. It has been said that the comparative state of civilization of a nation is indicated by the amount of soap it uses, and probably this is generally true in regard to individuals. There is no other single commodity which has done so much to decrease the death rate. It removes disease germs and helps to stop the spread of contagious diseases. Fatal epidemics of diseases such as cholera, typhus fever, bubonic plague, and smallpox have always flourished among people who have been content to keep their houses and bodies unclean.

There are many kinds of toilet soap, and some kinds are better than others. Usually the price is a good index of the quality, but not always. There are some excellent soaps that are inexpensive. Avoid using the cheap varieties that are highly scented, as they are made of inferior fats and the perfume is added to disguise that fact. One can make no mistake in using any standard soap. After washing, thoroughly rinse the soap from the hands and face with clear water. The practice of using liquid soap or soap powder in public lavatories is most sanitary. It prevents the spread of disease which might result from allowing different persons to use the same cake of soap.

QUESTIONS

1. What is the meaning of *function*?
2. In what ways does the skin protect the body?
3. What is a sensory organ?
4. What special sense does the skin contain?
5. Name some other sensory organs.
6. Specify some of the things which we learn through the sense of touch.
7. What is the normal temperature of the body?
8. How is the heat of the body supplied?
9. What becomes of the excess of heat?
10. How does the heat get to the surface?
11. Describe the action of the pores.
12. How does the perspiration cool the body?
13. Explain why there is more bodily discomfort on a muggy day than on one that is hot and dry.
14. Why does air in motion feel cool?
15. What changes take place if the body is exposed to cold?
16. What is an excretory organ? Name some others besides the skin.
17. How much perspiration is given out daily? Of what does it consist?
18. What is the origin of these harmful products?
19. Why is bathing necessary?
20. What else must be done to keep the body free from offensive odors?
21. When should warm baths be taken?
22. When should a warm bath be finished with water that is colder?

23. What effect do warm baths have upon the nerves? What bad effects are produced if too many are taken?

24. Mention several ways of taking cold baths. What is the best way? Why? Why is soap not necessary? What is the best time?

25. Why should water be drawn the night before for a tub bath?

26. Why should the skin be rubbed with a coarse towel? What is meant by a favorable reaction?

27. What are the beneficial effects of cold baths? When are the effects felt?

28. Why not bathe just before eating or within an hour and a half after? What exception is there to this rule?

29. How is a cold-air bath taken? Why is it sometimes preferred to a cold-water bath? What are its effects?

30. What is the nature of a Turkish bath? What does it accomplish? For what is it good?

31. What are the advantages of a swimming bath?

32. Compare salt-water bathing with fresh-water bathing.

33. How long may one stay in cold water? What are the signs that the stay has been too long?

34. What is the best way to enter the water? What harm is caused by standing around in cold water?

35. When is it wrong to go in?

36. What may well follow a sea bath?

37. Why are soap and warm water more needed on the face at night than in the morning?

38. What are the advantages of washing the face in cold water? How does hot water affect the face?

39. When ought the hands to be washed? Why before meals?

40. What are the advantages of keeping the nails clean? Why not clean them with the point of a knife? What may be used?

41. Why should the skin be kept pushed back from the nails? With what may this be done? Why should the nails be neither scraped nor bitten? Why is it well to cut or file them in a curve?

42. How is it possible for soap to influence the death rate? What are some of the diseases that flourish best where people are filthy?

43. Do you know of any excellent soap that is inexpensive? What is the objection to soaps that are cheap and highly scented?

44. What should always be done after washing with soap?

45. Where are liquid soap and soap powders in general use? Why is their use in such places most sanitary?

CHAPTER XI

THE HAIR

The scalp. Next to good teeth a fine head of hair is most essential to good looks. The one thing essential to a fine head of hair is a healthy scalp. A healthy scalp is thick, pliable, moves freely on the skull, and is abundantly supplied with blood. Also, it contains much fat. A poor scalp is thin and clings tightly to the skull. It does not contain nourishment enough to support a heavy growth of hair; it is as unreasonable to expect it as it would be to expect an abundant crop of wheat or potatoes on poor soil. A poor circulation of blood in the scalp is the principal cause of thinness of hair and of baldness.

Dandruff consists of flakes of dead skin. It is generally believed to be the cause of premature baldness. It is not the cause, but it is a sure sign that the scalp is in an unhealthy condition and that the hair will soon begin to come out if attention is not given to it at once. The cause of the dandruff and of the falling hair is the same, —a neglected and unhealthy scalp. Likewise, what will cure one will cure the other also.

Treatment. To keep the scalp in a healthy condition and prevent the hair from falling out, and to restore the scalp after the hair has begun to fall, there are four standard remedies: brushing, shampooing, massaging, and

oiling. The first and second are recommended for keeping a healthy scalp in good condition; the third and fourth, for scalps that have begun to show a marked weakness. For such scalps, brushing and shampooing might prove too vigorous.

Brushing. The scalp should be brushed morning and night with a stiff brush until a feeling of warmth is produced by the blood coming to the surface. Great care should be exercised not to brush so vigorously or so long as to produce soreness. If this should happen, do not brush again until all tenderness has disappeared.

The brush. For adults the bristles should be stiff and in tufts, and the tufts ought to be far enough apart so that the brush may be easily cleaned. For children and for others with tender scalps the bristles should be softer. The brush ought to be washed often with water containing a little ammonia, and dried in the sun with the bristles down to keep the water from softening the glue. The brush is likely to be injured if dried by artificial heat, especially if it is forgotten and left too long.

The comb ought to have teeth wide apart and blunt. Fine teeth pull the hair, and sharp teeth scratch and irritate the scalp.

Shampooing is simply a thorough washing. The frequency of this operation depends largely upon one's occupation. It should be done often enough to keep the scalp clean and free from dandruff. Once a month is usually sufficient. Lather the head. Any good toilet soap will do. Rub the scalp vigorously with the ends of the fingers. Wash off the lather with warm water. Follow

this with several rinsings. Dry thoroughly with towels. If possible, finish by exposure to direct sunlight. If this is not possible, substitute the kitchen stove or a warm radiator.

Massaging is merely rubbing the scalp with the ends of the fingers. Use a variety of motions. It forces the blood along in the veins and allows new blood to enter. It also brings the oil out of the oil glands and distributes it over the scalp and the hair. A part of the time use both hands, and endeavor to move the scalp and to lift it slightly from the skull.

Oiling. Shampooing sometimes makes the hair dry. Another cause of dry hair and dry scalp is the artificially heated air of the rooms in which we live. Whatever the cause, if the scalp is dry, some kind of oil ought to be applied. There is nothing better than vaseline. It has many times restored a scalp to a healthy condition when everything else has failed. Part the hair and apply the vaseline directly to the scalp with the ends of the fingers. Rub it in thoroughly. Avoid putting the vaseline on the hair. Olive oil also gives excellent results.

General suggestions. *Wetting the hair* occasionally in cold water will do no harm, provided the hair is thoroughly dried before combing. The cold bath toughens the scalp and prevents colds, and the rubbing necessary to drying stimulates the circulation. The practice of wetting the hair every morning is not recommended, as it removes too much oil. Combing the hair wet is harmful, as it keeps the roots too moist and favors the growth of bacteria.

Cutting the hair makes it grow faster but does not make it any thicker; that is, it does not increase the number of hairs. It is well to keep children's hair short. It makes it easier to keep the scalp clean, and also allows the easy access of sunlight and air.

In dressing the hair, avoid pulling. Pulling the hair has a tendency to loosen it and to make it fall out. Twists and knots that are uncomfortable should be avoided.

Hair tonics all fail to do what is claimed for them in the advertisements. Most of them are applied with rubbing, and that is their chief virtue.

Large, unsightly hairs can be removed from the face by the use of the electric needle without leaving scars and without pain. This should always be done by a skilled operator. The use of any patent applications for this purpose is dangerous and cannot be too strongly condemned.

Gray hairs appear in some heads much earlier than in others. Nothing has yet been discovered to prevent them. Dyeing the hair destroys its natural beauty and is not resorted to by people of the best taste.

Hats. Premature baldness among men is very common. Probably tight-fitting hats have more to do with this than any other cause. To be convinced that the hat is especially bad it is only necessary to observe that baldness does not extend below the line of the hat in the majority of cases. Many times it can be seen that the hat has made a deep indentation, or furrow, around the head. The arteries which supply the scalp with

blood pass upward between the skin and the hard, unyielding skull. Any hat tightly pulled down is sufficient to account for a dry, starved scalp. But the ordinary hat does more than that; it keeps out the beneficial rays of the sun, stops the circulation of air, and prevents proper evaporation of perspiration. The derby is the most objectionable of the contrivances worn by men and boys, and the cloth cap is the least objectionable. Women's hats are not so bad, because they do not fit the head. They allow free access of air and do not hinder the circulation. Women are rarely prematurely bald. If it were customary for men to go bareheaded, baldness would be uncommon. Nobody ever heard of a bald-headed savage.

Do not wear a hat more than is necessary; never wear it in the house. Avoid pulling your hat down tightly, especially when perspiring. Go bareheaded when exercising. Do not sit with the head near a lighted lamp, a gas jet, or an electric light.

QUESTIONS

1. What are the characteristics of a healthy scalp? of a poor scalp?

2. What is the principal cause of baldness?

3. What is dandruff? Of what is it a sign?

4. For what are brushing and shampooing recommended? oiling and massaging?

5. Why does brushing produce a feeling of warmth?

6. What precaution should be taken in regard to brushing? Why?

7. What kind of brush is most easily cleaned?

8. Give directions for cleaning a hair brush.

9. Why should the teeth of a comb be wide apart? Why should they be blunt?

10. What is shampooing? How often should it be done?

11. Give directions for shampooing.

12. What is massage? What are the benefits of massage?

13. Give directions for massaging the scalp.

14. How may a dry scalp be caused?

15. What remedies are recommended for a dry scalp? Give directions for applying them.

16. What is the objection to wetting the hair every morning? of combing it wet?

17. What are the advantages of keeping the hair short?

18. In dressing the hair, what should be avoided? Why?

19. What is the value of hair tonics?

20. How may large, unsightly hairs be removed from the face? What precautions are suggested?

21. Can anything be done to prevent gray hairs?

22. What are the objections to dyeing the hair?

23. In what four ways are men's hats bad for the scalp?

24. Why are women's hats better?

25. Mention four precautions which should be taken in order to preserve the hair.

CHAPTER XII

CLOTHING

Wool. For fall, winter, and spring, in a climate where the changes are frequent and sudden, there is no other material so good as wool for garments to be worn next to the body, especially for those who are much in the open air. There are two reasons for this: One is that wool, from the nature of its fibers, is loosely woven and so contains much air space. Air is a very poor conductor of heat. Hence woolen garments tend to prevent the escape of heat from the body. The other reason is that wool can absorb a great deal of moisture without causing a feeling of dampness or cold. This is because wool, while it absorbs the moisture readily, allows it to evaporate very slowly. If the evaporation were rapid, the result would be quite different, for evaporation produces cooling.

Of the disadvantages of wearing wool there are two that are important: it is expensive, and it is inclined to shrink and contract its air spaces in washing. For the former there is no remedy, but the latter can be largely overcome by using care in washing. Wool should be washed in tepid water, with soap used sparingly, and without violent rubbing. Use soap of good quality. Do not rub it on the cloth, but dissolve it in the water.

Before hanging them out, pull the garments into nearly their original shape. As it is very important that wool should be dried as quickly as possible, do not wash woolen garments on a cloudy day.

Cotton. The world uses more cotton cloth than all other fabrics combined. It is cheap, strong, and durable; it does not absorb odors readily; and it shrinks much less than wool. Furthermore, its fibers lie so close together that little air is retained, and consequently heat is allowed to escape freely from the body. Therefore it is a very cool material for summer clothing or for garments worn in heated rooms in winter. This close texture, however, is the cause of one serious disadvantage: namely, that it easily becomes wet and permits rapid evaporation, which is likely to chill the body. Much of the value of cotton for underwear depends upon the quality of the material and the way in which it is manufactured. That is best which is loosely woven and porous.

Garments of cotton and wool mixed combine some of the best qualities of both, and are preferred by many, especially for winter wear, to those made of either cotton or wool alone.

Winter clothing. Most men whose occupation is indoors make the mistake of dressing too warmly in winter. When the cold weather begins they put on a heavy outside suit and heavy underwear, and then remain all day in rooms where the air is unnaturally dry and at a temperature nearly equaling summer heat. Some do even worse than this, and sit in small, highly heated offices with the windows closed. No fresh air reaches

the skin, the rays of light cannot penetrate the clothing, and the pores are kept continually open. The result is that in a short time the skin, thus stifled, gets into a generally weakened condition, so that it is unable to react and accommodate itself to changes, and this causes tenderness, colds, and other troubles.

Some men, on the contrary, go to the opposite extreme and wear thin cotton underclothing all winter, and even go without an overcoat. This seems unwise, as it allows too great a loss of heat from the body.

The best method is somewhere between these two extremes, and probably would consist in wearing medium-weight clothing indoors, with the addition of a warm overcoat when going out. Also, the practice of changing the ordinary street coat for a light house or office coat on coming in seems to be excellent.

Rubber raincoats. These are suitable for riding, because they keep out the wind and rain; but they are not so good for walking, as they keep in the perspiration and do not allow a sufficient circulation of air. Raincoats of waterproofed cloth are preferable, as they are better ventilated.

Stockings. The feet perspire more freely than most other parts of the body, and the odor of perspiration is offensive. Hence it is necessary to change the stockings often. There are great individual differences in amount of perspiration, and one rule will not do for all; but it is safe to say that there is no danger of changing the stockings too often. Many people think that once a week is sufficient, but some ought to change every day,

especially in warm weather. Also, stockings wear better if washed frequently. Soiled stockings are subject to bacterial action which weakens the fiber.

Garters. Circular garters, if tight, interfere with the circulation of the blood, especially hindering the return of the blood from the feet to the heart. The veins in which this return is made lie near the surface, so that not only is the flow of blood retarded but sometimes the veins themselves become permanently enlarged, which is a very serious matter. On the other hand; hose supporters sometimes tend to cause a stooping carriage and round shoulders. In either case great care should be taken not to have them unnecessarily tight.

Corsets. It is extremely unhygienic to wear corsets and girdles that are tight.

1. They interfere with the breathing, especially weakening the lower part of the lungs.

2. By taking the place of muscles in supporting the body, they destroy the efficiency of the muscles and weaken the waist and back.

3. They crowd the internal organs and seriously interfere with their action. In order to do their best work, the heart, lungs, liver, stomach, and other internal organs need all the room which nature provided for them.

4. Tight corsets and their natural resultants, a weak waist and back, cause a stiff and awkward carriage, contrasting very unfavorably with that of the strong and natural waist, which gives grace and harmony to the movements of the body.

QUESTIONS

1. Why are woolen garments especially useful in preventing the escape of heat from the body?

2. Why do they not make one feel cold even though they are damp?

3. What are the disadvantages of woolen clothing?

4. Give directions for washing woolen garments.

5. What are the good qualities of cotton cloth?

6. Why is cotton excellent for summer clothing? What is its principal disadvantage? What is the best cotton for underwear?

7. Why is it harmful to dress too warmly in winter?

8. Why is it unwise to wear winter clothing that is too thin?

9. What is the most hygienic way to dress in cold weather?

10. Why are rubber raincoats not good for walking? What is better? Why?

11. Why is it necessary to change the stockings often?

12. Why are circular garters not recommended?

13. Why should hose supporters not be too tight?

14. State four reasons why tight corsets and girdles are unhygienic.

CHAPTER XIII

SHOES

Importance of fit. Comfort ought to be the first consideration in selecting shoes. To be comfortable they ought to fit. To fit they must be shaped like the foot, and be neither too large nor too small. An idea of the shape of the foot can be gained by placing the foot on a piece of paper and marking around it with a pencil. It will be evident at once that a shoe with a pointed toe or one with a square toe will not fit. No matter what fashion dictates, the toe of a shoe should be rounded if it is to conform to the foot.

Size. When a new shoe is first put on, it should be longer than the foot by one half or three fourths of an inch. With use the foot will work forward and take up the extra space. If properly selected, a new shoe will be perfectly comfortable.

Sole. A flat sole is preferable to one that is rounded at the end and sides, on account of its greater bearing surface on the ground. The sole should be thick enough to be firm, but not too thick to be pliable.

Heel. Regardless of fashion, heels should be broad and low for all except those whose feet have already become permanently deformed. High heels, especially the exaggerated kinds, strain and weaken the arch of the

foot; they throw the weight forward onto the toes and, by crowding them into the ends of the shoes, cause corns, bunions, and deformed toes.

Height. Low shoes are more hygienic than high shoes, because they allow better ventilation to the feet. Also, by giving no support to the ankles, they tend to make them stronger. There is no doubt that they are better than high shoes for summer wear, but they hardly afford protection enough for winter, and are especially bad in snow.

Material. Glazed leathers (patent finish) are impermeable to air and do not allow the perspiration to evaporate properly. Hence they are not as good for the feet as leather of the ordinary finish. Tan shoes are cooler than black and so are better adapted to summer wear.

Weight for winter. If a person's occupation keeps him out of doors all day, heavy, warm, waterproof shoes are undoubtedly the best; but if much of the time is spent indoors, they are far from ideal. In the house they are too warm and cause the feet to sweat. Since they are waterproof, the perspiration cannot escape, and on going out in the cold the feet feel damp and uncomfortable. A better plan would be to wear shoes of medium weight, and in cold or wet weather to add rubbers or arctic overshoes. Rubbers and overshoes by keeping the feet warm and dry are of value in preventing colds, but should never be worn in the house or in the schoolroom, for they cause sweating and tenderness of the feet, which will more than offset the protection which they otherwise would afford.

QUESTIONS

1. Why does a shoe with a square or a pointed toe not fit the foot?

2. How can a good idea of the size and shape of the foot be obtained?

3. How much longer than the foot ought a new shoe to be? Why?

4. Why is a flat sole preferable to any other?

5. What are the advantages of broad soles?

6. What is the proper thickness of soles?

7. Why are high heels harmful?

8. Why are low shoes more hygienic than high shoes? What other advantage do they possess? When are they at a disadvantage?

9. Why are patent-leather shoes not as hygienic as other kinds?

10. Why are tan shoes better for summer than black?

11. Why are waterproof shoes not good for indoor wear? What is a good arrangement for winter?

12. Why should rubbers and overshoes not be worn indoors?

CHAPTER XIV

THE NOSE AND THROAT

Parts of the nose. The nose consists of two parts, the outer, or facial, part and an inner part in the skull. The outer nose is divided into two parts by a bone called the vomer. The inner nose consists of two high and narrow air passages extending as far back as the roof of the mouth does. These end in a roomy chamber called the nasopharynx. The nose is lined with delicate mucous membrane containing many nerves and many mucous glands.

Functions of the nose. The nose has several functions. It warms the air inhaled and supplies moisture to it; it catches dust by hairs at its entrance and by its moist lining; it destroys harmful germs. The moist mucus is a mild germicide. The sense of smell is also located in the nose.

Obstructions to the nasal passages. The most common nasal troubles are due to obstructions to the passages. The obstructions are usually caused by swelling of the mucous lining, adenoid growths, or mucous growths called polypi.

Adenoid growths are caused by enlargement of the third tonsil, a structure situated behind the posterior opening of the nose. This condition is common in children and calls for surgical treatment.

Polypi are more common in adults than adenoid growths are, and they require the same kind of treatment. Swelling of the mucous membrane is common to all ages and is due to an inflammatory condition from colds in the head.

Obstruction in the nasal passages produces *mouth breathing*. As a natural result in children the nasal passages do not grow, but remain abnormally small; the upper jaw remains narrow, and the front upper teeth are crowded together and pushed forward until they protrude, making the upper jaw longer than the lower. Examples of this are very common. The habit of sucking the thumb produces the same malformation. Another bad result of mouth breathing is that dust and germs of diphtheria, bronchitis, pneumonia, and tuberculosis have direct entrance to the throat, air passages, and lungs.

Tonsils. The tonsils are small, almond-shaped bodies situated on the sides of the throat, one on each side. They may be seen by the aid of a hand mirror. If enlarged, they are more liable to infection than any other part of the body. If greatly enlarged, they may interfere with breathing and hearing. They are frequently enlarged as a result of repeated colds and sore throat. Their removal is not difficult and is often attended with very beneficial results.

Focal infection. The danger of bodily infection from decayed teeth has been mentioned in a previous chapter. The tonsils, the root of the tongue, and the cavities of the head leading into the nose are even greater sources of danger. If there is infection in any of these parts, the bacteria from the infected part as a source or focus

are carried away in the blood, and, becoming established in some other part of the body, may cause heart disease, goiter, rheumatism, kidney trouble, or some other serious bodily condition. There is no way in which one can guard against focal infection except by a periodic examination by a physician.

Colds. Many persons fail to realize the importance of colds. Colds are bacterial diseases and must not be regarded too lightly. They lower the vitality of the body and reduce its power of resistance to other diseases. Neglected colds frequently result in tuberculosis, pneumonia, and other serious diseases.

Conditions which accompany colds. There is always an inflamed condition of the part of the body in which a cold is located. If the cold is in the head, the inflammation is in the lining of the nose; if in the throat, it is in the lining of the pharynx and larynx; if in the chest, it is in the lining of the windpipe and its branches in the lungs. The inflamed part is flushed with blood and is red, swollen, and sometimes hot and painful.

Conditions which favor taking cold. Inflammation is not the cause of a cold, but an inflamed condition is most favorable to its beginning. Inflammation in the delicate linings of the nose, throat, and air tubes is due to congestion, which in turn is caused by an oversupply of blood in the inflamed part. Oversupply of blood in the internal surfaces of the body is produced by a constriction, or narrowing, of the blood vessels near the external surfaces. This is caused by a chill to the surface, not sudden, but prolonged. From a sudden chilling

of short duration there is a quick recovery, in which the blood returns to the surface with more than its usual vigor, but in prolonged cooling, even though the temperature be only a little below that which is comfortable, there is no such natural reaction. Hence it is the prolonged chilling which is to be feared and avoided. The most common causes are sitting or lying down without sufficient covering in a room that is too cold, sitting in a draft or in clothing that is damp, and going out into cold air after being in an overheated room. Any one of these conditions will produce a cooling of the body which will drive the blood from the surface into the internal organs. This result does not follow if one is exercising enough to keep the blood circulating freely in the skin.

Treatment. If promptly attended to in its earliest stages, much may be done to relieve a cold; but if allowed to get a good start, all that can be done is to keep the body in as vigorous a condition as possible until the cold has run its course. The first thing is to try to restore the skin to its normal condition. This can be done by putting on more clothing, by changing to dry clothing if necessary, or by remaining in a warm room. If this is not sufficient, benefit may be derived from a hot bath or from drinking a generous amount of hot water or of hot lemonade. If a cold does not yield to this treatment in its first stages, it is of very little use to try to doctor it yourself. From this point on, the very best one can do (and this cannot be emphasized too much) is to remain in bed, warmly (not too warmly) covered, in a room well ventilated but free from drafts.

It is well to wear some kind of cap on the head for additional protection. Light food only should be eaten, and great care should be taken not to overeat. Exercise should be avoided, and no work should be done, so that the body may have full use of its resistive power. A severe cold requires the attention of a physician.

Prevention of colds. People differ greatly in their susceptibility to colds. Some have them often, while others are practically immune. It is impossible to state why this is so or to give any rules by which colds may always be prevented. If certain precautions are taken, however, many colds may be avoided. Those who take cold easily should heed the following suggestions:

Keep the body clean, and keep it in the best physical condition by plain, nourishing food, fresh air, sunlight, sleep, and exercise. A fatigued body is susceptible to any disease.

Spend a part of each day in the open air, and try to accustom the skin to cold air and drafts. Those who live out of doors rarely have colds.

Do not keep your living rooms too warm or wear too warm clothing indoors. Both of these practices weaken the resisting power of the skin.

Avoid the bad air of overcrowded and poorly ventilated rooms. It is likely to contain the germs of many diseases.

Change from damp to dry clothing as soon as you stop exercising.

Cold-air baths are excellent, also cold-water baths for those who are strong enough to endure them.

Colds are infectious. Avoid the breath of anyone who has a cold. If you have a cold, be careful not to give it to others. Keep the mouth covered when coughing or sneezing.

Catarrh. Catarrh is caused by repeated colds which are neglected. It is difficult to cure. It certainly cannot be cured by any of the highly advertised patent remedies. It can be prevented by taking proper care of each cold as it occurs. The best treatment that can be recommended is that which is suggested under the heading "Prevention of colds."

QUESTIONS

1. Describe the outer nose; the inner nose.
2. In what does the inner nose end?
3. With what is the nose lined?
4. What are the functions of the nose?
5. What are the most common obstructions to the nasal passages?
6. What are adenoids? How should they be treated?
7. What are polypi? How should they be treated?
8. What are the results of mouth breathing?
9. Describe the tonsils. Why are enlarged tonsils a source of danger?
10. What parts of the head are especially liable to dangerous infection?
11. Explain how such an infection may lead to disorders in other parts of the body. What precaution should be taken?
12. What serious results often follow colds?

13. Describe some of the conditions which accompany colds.

14. How are colds frequently caused?

15. What is the best way to treat colds in their earlier stages?

16. How should colds be treated if they do not yield to first treatment?

17. Mention several precautions against taking cold.

18. How may the body be kept in good condition?

19. In what places is bad air likely to be found?

20. What should be done to avoid taking a cold from another person?

21. What should be done to avoid giving a cold to another?

22. How is catarrh caused? How may it be prevented?

CHAPTER XV

THE CHEST AND LUNGS

Round shoulders and flat chests. Eighty per cent of all lung troubles originate in the top of the lungs. Persons with round shoulders and flat chests are much more likely to have diseases of the lungs than are those with well-formed chests. The flat chest presses down upon the upper parts of the lungs, so that they are rarely filled with air. This disuse causes poor circulation of blood in these parts and a weakened condition which invites disease.

Lateral curvature. Another common deformity among school children is a bend to the side, called lateral curvature. This and round shoulders are often caused by improper sitting at a school desk, especially when the pupil is tired. It is also harmful to stand habitually with the weight on the same foot and to carry books always on the same side. In lateral curvature one shoulder is lower than the other, and trouble is caused in the top of one lung only.

The seat of the trouble. The chest of a young, growing child is plastic, and while it easily gets into a wrong position by some improper practice, it may easily be brought back to its normal position by proper care and treatment if taken in season. Although the deformed

chest shows most plainly in the shoulders, the real seat of the trouble is in the muscles of the back. This is easily demonstrated by raising the chest as high as possible by muscular force, and keeping it there for a minute or two. The feeling of fatigue which results will not be noticeable in the chest or shoulders, but in the large muscles of the lower part of the back.

Remedy. The remedy is to strengthen the weak muscles. The surest and quickest way to accomplish this is by a systematic set of exercises, prescribed by a teacher of physical training and performed regularly with the use of gymnasium apparatus. In case this is not possible, another method is suggested which requires no gymnasium, no apparatus, no special allotment of time, and is efficient in preventing as well as in remedying the defect.

Whenever you feel tired in school, instead of slouching down and leaning on the desk, square the shoulders and raise the chest as high as possible. Then take two or three breaths, slowly filling the lungs to their full capacity. This will not only relieve the feelings, but, if done regularly, will strengthen the muscles of the back, give a correct position to the shoulders and chest, enlarge the chest, and improve the circulation of blood in the lungs.

Get into the habit of squaring the shoulders, raising the chest, and filling the lungs whenever you start to go from one recitation to another. Do the same in the open air on leaving school and when starting for school in the morning.

All of the above should be done seriously and without attracting attention.

If these exercises are persisted in, the muscles of the back will grow so strong that the correct position will become the natural one and will be assumed at all times without thought or consciousness. Indeed, in a comparatively short time it will be difficult to assume any other.

Benefits of erect carriage. Not only is an erect and easy carriage conducive to health, but it is also of great importance to personal appearance. It is absolutely essential to physical beauty, and is so suggestive of force, ability, and self-respect as to become easily an important asset in determining success in any business or profession.

Shoulder braces are worse than useless. They make a person stiff and awkward, and weaken the very muscles that need strengthening. This does not apply to cases of diseased spines which may require braces in treatment.

Consumption. Consumption, or tuberculosis of the lungs, is a world-wide disease. There are more than a million deaths per year from consumption in the world, and in the United States about 100,000 deaths per year, which is nearly one tenth of the total number of deaths from all causes.

Consumption is *not inherited*, but some families are more susceptible to it than others. *It is infectious;* that is, it can be transmitted from one person to another. The two great sources of danger are the person who has the disease, and infected dust.

The greatest danger is from carelessness. In coughing, in sneezing, and in speaking, little drops of saliva

are discharged into the air for a distance of from two and a half to three feet. This saliva is infected. It is more dangerous than infected dust and cannot be too carefully avoided. One breath of this tainted air is sufficient to transmit the disease, provided the germs find a suitable lodging place in the nose, throat, or lungs.

The sputum. Every drop of a consumptive's sputum contains thousands of living, active bacteria, every one of which is capable of transmitting the disease. The bacteria discharged in the sputum of a diseased person in one day amount to many millions. If all the people afflicted with this disease were to spit promiscuously, the air would soon be filled with germs. Unfortunately there are many who do. Careless spitting is the cause not only of much consumption but also of colds, bronchitis, and pneumonia. When the sputum dries, the bacteria are blown about in the dust of the air. They are in a dormant condition, but for a long time retain the power of awakening into activity in the lungs of those who are unfortunate enough to inhale them. One of the best movements of the present time is that which prohibits spitting in public places. Many persons are prevented by fear of arrest, but every intelligent person should cheerfully conform in the interest of public welfare.

If every consumptive would spit into a receptacle containing a strong antiseptic solution, or into a cloth which is immediately burned, consumption would soon become a rare disease. The best solutions are a 5 per cent solution of carbolic acid and a strong solution of lye. The edges of the containing vessels should be protected from flies.

Infected dust. Disease germs are more abundant in houses than in the open air. Therefore let the air and sunlight into the house. Direct sunlight is said to kill the germs of consumption in half an hour. Disease germs of all kinds are most abundant in the air of damp, dark, poorly ventilated rooms. The room in which a consumptive has lived must be fumigated. This should be done in a very thorough manner. Experiments prove that the bacteria of consumption may become active after remaining several weeks upon the floor, walls, carpet, and draperies of a consumptive's room. From this source of contagion whole families have died in the past, before the nature of the disease was understood.

Curability. It is claimed that about 75 per cent of the cases of consumption are curable if discovered early and if treatment is undertaken at once. It is a matter of record in Massachusetts, however, that only about $16\frac{2}{3}$ per cent of the cases that come under the care of physicians actually recover. The disease is well understood, is being successfully treated, and has steadily decreased since the discovery of its cause by Koch in 1881. Statistics show that it has decreased more than 50 per cent in the United States in the last thirty years.

Influence of climate. Experience has proved conclusively that some climates are more favorable to weak and diseased lungs than others. Therefore, if possible, one who belongs to a consumptive family should move to a favorable climate before he is compelled to. The suburbs are better than the city, and an elevation is better than the sea level. The most ideal conditions are found in

Arizona, Colorado, and New Mexico. Owing to their great distance from the sea or any other large bodies of water, the air is dry and there is comparatively little cloudy weather. Dry air and sunshine are hostile to disease germs. On account of the high elevation the air is thin and free from the heavier kinds of dust. This rarefied air compels deep breathing, so that all parts of the lungs must be used. More blood passes through their capillaries, and the weak parts become strong. Moreover, the nights are cool, insuring refreshing sleep.

Home treatment. While cool nights and dry air that is free from dust and germs represent the most favorable conditions, fortunately they are not essential to a cure. Many people afflicted with tuberculosis are unable, for financial or other reasons, to make any change of climate, and must make the best of conditions at home. This should not in any way be considered discouraging, for home treatment has been so perfected as to become effective, if properly carried out, in all cases except those which have progressed too far before treatment is begun. The remedy is plenty of sunlight, fresh air, nourishing food, and rest. Avoid exercise and everything that annoys. Keep warm and remain in the open air twenty-four hours a day, summer and winter.

Every case of consumption should be under the care of a physician, and a physician should be consulted immediately if consumption is suspected.

Prevention. Immunity depends largely upon the standard of one's health. Those who are ill fed and poorly nourished, and who live in badly ventilated rooms, are

the most susceptible to consumption. Some are immune even under these conditions; others can avoid the disease only by keeping in the most robust health. In general, if you wish to avoid consumption or any other disease, eat plain, nourishing food, take plenty of sleep, be in the open air as much as possible, exercise regularly, and avoid alcohol, tobacco, and excesses of all kinds.

QUESTIONS

1. Why are people with flat chests more subject to lung troubles than those with well-formed chests?

2. How are round shoulders often caused?

3. How is lateral curvature caused?

4. Where is the seat of the trouble if the chest is flat and the shoulders are round? How can this be demonstrated?

5. What is the best way to remedy these defects? Give directions for overcoming these defects without the use of apparatus.

6. What are the benefits of an erect carriage?

7. Why are shoulder braces not recommended?

8. What per cent of the deaths in the United States are caused by consumption?

9. Is consumption inherited? What is meant by saying that a person is *susceptible*? What does *infectious* mean?

10. Explain how a careless person who has consumption may be a great source of danger to others.

11. Explain how spitting in public places may become the cause of consumption and of other diseases.

12. How should a consumptive's sputum be disposed of?

13. Why should the room where a consumptive has lived be thoroughly fumigated?

14. To what extent does consumption yield to treatment?

15. Explain why country air is better for weak lungs than city air; an elevation better than sea level; dry air better than damp; sunshine better than cloudy weather.

16. In what parts of the United States are the conditions most nearly ideal for consumptives?

17. Outline a method of home treatment for consumptives.

18. Under what conditions are persons most liable to contract consumption?

19. Give an outline of how anyone should live in order to avoid consumption and other diseases.

CHAPTER XVI

THE EYE

Defective vision. Defects of vision are much more common than they were a few generations ago. This is due to our changed conditions of living. If our eyes were used no more than were those of our ancestors, in study, in reading, in sewing, and in other fine work at short range, our sight would be as good as theirs. The normal eye sees objects at a distance without effort, but has to exert itself to see clearly small objects which must be held nearer than three or four feet. This change in the eye is called accommodation, and is brought about by the action of muscles. Much of the work of to-day requires the use of the eyes upon near objects. The prolonged use in this way produces a strain upon the muscles which is responsible, more than anything else, for the defective vision which is so common.

Signs of defective sight. Eye defects do not, as a rule, tend to correct themselves, but, on the contrary, grow steadily worse. Hence it is imperative to consult an oculist as soon as the trouble begins to make itself known. The most common signs of defective sight are indistinct vision, tiring quickly from reading or study, and nervousness or headaches.

Indistinct vision is shown by a blurring or running

together of letters, inability to read fine print, or inability to see what is written on a blackboard across a room. Headaches are very common from eyestrain, and many are the witnesses who can testify to prompt relief upon being properly fitted to glasses.

Long sight. The power of accommodation grows less as people grow older. Consequently most middle-aged and old people require glasses for reading.

Short sight. Many young people so strain their eyes by improper use at close range that the eyes become permanently deformed and are unable to return to their normal shape. Hence objects at a distance are seen indistinctly. This condition may be brought about by reading fine print or by reading in a bad light. Avoid print that is too small to be read easily at arm's length. All persons with short sight should resort to glasses.

Watering of the eyes. The tear glands lie just above the outer corners of the eyes and normally secrete only enough tears to keep the eyes moist. Any slight excess is carried to the nose through the tear ducts, which lead from the inner corners of the eyes. Occasionally, from emotion or from irritation by wind, dust, or intense light, the amount of moisture becomes excessive, and tears overflow and run down the face. If this difficulty is temporary, it may be ignored, but if it continues, it requires attention. It may be due to a dusty occupation, or to eyestrain from excessive reading or working in a bad light, or to defective sight, or to an inflammation of the membrane of the lid. A physician should be consulted, as this condition may lead to serious inflammation.

Red eyes. The eyeball is covered and the lids are lined with mucous membrane like that of the nose and throat. This membrane, except the part that covers the front of the eyeball, contains many blood vessels. Any irritation causes congestion and redness. This condition is called conjunctivitis. It may be due to colds, to chronic catarrh, or to any of the causes mentioned under "Watering of the eyes." The surfaces are often roughened, and there is a feeling of "something in the eyes." If it were certain that red eyes indicated only ordinary conjunctivitis, it would be sufficient to recommend a simple eye lotion; but, unfortunately, diseases which often destroy the sight begin in the same way. Therefore, unless one is reasonably certain of the cause of inflamed eyes, it is wise to take steps to find out.

Cinder in the eye. The most common form of injury to the eye is caused by the lodging of cinders or other solid particles on the eyeball or under the lid. In most cases the tears will remove the offending body quickly if nothing is done to hinder. The natural tendency is to clap the hand to the eye and to press upon the lid. This is precisely what should not be done, as the pressure forces the cinder into the soft tissue, where the tears are powerless to effect a removal. No matter how sudden or how painful the injury from this cause, do not touch the eye. Allow the tears to flow unobstructed, and in a large majority of cases the trouble will soon be at an end. If, however, the cinder becomes lodged, as sometimes occurs, it may be easily located and taken out by any careful person. It may be removed by using a piece of clean

cloth rolled into a point and moistened, or with absorbent cotton twisted around the end of a match or a toothpick. The cinder will usually be found adhering to the lining of the upper lid.

Black eye. The eyeball is well protected from injury by blows because it rests on a cushion of fat in a bony socket. A comparatively slight injury, however, causes the blood to settle in the surrounding loose tissue, producing what is ordinarily termed a "black eye." No harm is likely to result from this, but as it is a temporary disfigurement, steps ought to be taken at once to reduce the swelling and to check and remove the discoloration. At first cold compresses should be applied, to keep the blood away from the eye as much as possible; later, hot compresses, to hasten the absorption. After this the discolored part may be painted flesh color.

Some things which are bad for the eyes. No matter how good your eyes are, there are some things that must be avoided. Among these are fine print, shiny paper, weak light, and unsteady light. A weak light is that between sunset and dark or that at too great a distance from an artificial light. An unsteady light is one that flickers; it tires the eyes very quickly. The effect of reading in a moving train or trolley is similar. Do not read too long at any time without looking up. Momentarily looking at a distant object will afford great relief. When reading or studying, do not face the light. Sit so that the light will come over the left shoulder. Do not read while lying down; it is almost impossible in that position to hold the page at the right distance, at the

right angle, and, at the same time, in a proper light. It puts an intense strain on the muscles of the eyes and is especially bad for a person who is already tired or who is recovering from sickness.

The eyes and the general health. Just as trouble with the eyes may, and often does, produce other effects, such as indigestion and headache, so conditions of general health may affect the eyes. It is not uncommon to find that a restoration to health has also restored vision that was impaired. Therefore it is necessary for one who would preserve good vision through life to observe the laws of general health as well as those pertaining to the eye itself.

QUESTIONS

1. Defective vision is more common than formerly. Give some of the reasons for this.

2. What is accommodation?

3. Why is it necessary to consult an oculist early if there is any trouble with the eyes?

4. What are the most common signs of defective vision?

5. How is indistinct vision shown?

6. Why do most middle-aged and old people require glasses for reading?

7. What is meant by *short sight*? How may it be caused? How may it be relieved?

8. Explain the location and use of the tear glands and tear ducts.

9. How may excessive watering of the eyes be caused? When does this require attention?

10. What is conjunctivitis? How may it be caused? Why should it not be disregarded?

11. What is nature's way of removing a cinder from the eye?

12. What harm is done by pressing on the lid with the hand?

13. Give directions for removing a cinder if it becomes lodged.

14. What is the cause of a black eye? How should it be treated?

15. Name four things which are bad for the eyes.

16. What is meant by *weak light* and *unsteady light*?

17. How ought one to sit when reading?

18. Why is it harmful to read while lying down?

19. What effect upon impaired vision does a restoration to health often have?

CHAPTER XVII

THE EAR

Parts of the ear. The ear consists of three parts: the outer ear, the middle ear, and the inner ear. The outer ear has two parts, called the auricle and the auditory canal. The auricle is the part which is ordinarily called the ear. In some animals, as the horse, it is movable and can be directed forward or backward to catch sound, but in human beings even its total loss would not affect the hearing appreciably.

Freezing. Owing to their thinness, large surface, and exposed position, the auricles are more likely to freeze than any other part of the body. If freezing should occur, the frost may be taken out by rubbing the ears with snow or by bathing them with cold water. For severe chilling and frost-bite see Chapter XXI, page 135.

Washing. The auricles, on account of their irregular shape, are especially likely to collect dust and dirt. They should be washed daily, care being taken to reach every part. If any spot is neglected, dirt accumulates rapidly until it becomes conspicuous and unsightly.

The auditory canal. This canal is narrow and curved and is a little more than an inch deep. It is closed at the bottom by a partition called the drumhead. This partition divides the outer ear from the middle ear. The

outer two thirds of the canal is lined with hairs. At the base of each hair is a gland which secretes a yellowish, sticky oil. This oil moistens the hairs and enables them to catch all of the dust and dirt which naturally enter the ear. Gradually this oil hardens into little pieces of wax, which work out of the ear, carrying the dirt which has been collected. This is how the canal is kept clean. If it were not for this, it would in time become filled with dust and dirt.

Wax. Healthy ears contain only enough wax to keep the hairs sticky, and a person should not be conscious that any wax is coming out. Digging in the ear with the finger, or with anything else, to remove the wax, is a bad practice and can result in nothing but harm. The thin lining is very tender and easily injured, and digging will only push the wax back and cause it to collect. Sometimes the wax collects in such quantity as to cause temporary deafness. In such a case it can be removed by a physician, easily and without danger, by syringing with warm water. There is nothing that can be done at home. The familiar practice of dropping in oil is harmful, as it causes the wax to expand, which only increases the trouble. After being syringed, the ear should be dried as well as possible and a piece of cotton put in for a day or two, but care should be taken that the cotton is finally removed.

Wearing cotton. In general the practice of wearing cotton should be discouraged, as it interferes with the natural escape of wax from the ear and, if forgotten, may work into the ear and become the cause of an excessive and troublesome wax collection.

Foreign substances. *A solid particle* as large as a small pea may get into the ear by accident and cause no trouble, even though it remains for many years. Such particles do not cause the wax to collect, because they finally lodge in the deeper part of the canal beyond the hairs and wax.

Insects sometimes crawl into the auditory canal and refuse to come out. They are extremely annoying, but cannot be the source of any harm except that which is self-inflicted in the frantic efforts which may be made to remove them. Insects do not often get into the ear, but if one should, do not get excited. The insect cannot get beyond the partition previously mentioned, and will do no harm even though it is never removed. A little warm water poured into the ear will usually bring it to the surface. If this is not sufficient, it can easily be syringed out.

Drumhead. The *drumhead* is a thin, tense membrane, already mentioned as a partition between the outer ear and the middle ear. Its purpose is largely to keep dirt out of the delicate middle ear. Hearing does not depend upon it, but an injury to it will often destroy the hearing, as other parts are usually injured at the same time. It may be torn or penetrated by anything thrust into the ear, as, for example, by a hairpin or a toothpick. It may be burst by a violent fit of coughing or by a blow on the side or back of the head. It may be destroyed by eruptive diseases like measles, scarlet fever, and smallpox.

In case of its destruction by disease the hearing is not necessarily destroyed, and can be greatly assisted by inserting a piece of absorbent cotton loosely into the deeper

part of the auditory canal. This cotton should be removed at night and renewed in the morning. Patented "artificial ear drums" are often advertised, but they are not so good, nor are they so hygienic, as the cotton.

The middle ear. The middle ear, or drum, is the seat of two thirds of all ear troubles. It is lined with soft, moist, mucous membrane, like that of the nose and throat, and is connected with the throat by the *Eustachian tube.* This tube allows air to enter the drum and also allows moisture to flow out. The air entering the drum makes the pressure on the inside of the drumhead the same as that on the outside. Swallowing and yawning cause the tube to open. Swallowing with the nose closed withdraws the air. (Try it. Hold the nose, and swallow.)

Inflammation of the middle ear. In an ordinary cold in the head the lining of the throat and nose becomes red and swollen and discharges mucus freely; sometimes the swelling is sufficient to close the nose entirely. The same thing may happen to the lining of the middle ear and its Eustachian tube, and from the same cause, — a cold. A cold may settle in one ear or in both ears and may produce two very unpleasant results, although not necessarily both at the same time. One of them is temporarily impaired hearing; the other is earache. Both are primarily due to the closing of the Eustachian tubes. The hearing is interfered with because the air cannot pass into the middle ear and therefore cannot make the pressure on the inside of the drumhead the same as that on the outside. The earache is due to the pressure of the mucus which cannot escape, and which gathers until

it fills the middle ear. This is what is ordinarily known as a "gathering in the ear." When the pressure becomes sufficient a tiny hole is burst in the drumhead, there is a discharge of mucus through the auditory canal, the pressure is relieved, and the earache ceases. After a time, if everything progresses favorably, the inflammation passes away, the Eustachian tubes open, and the hearing becomes normal. Finally, the hole in the drumhead heals, that is, becomes filled with scar tissue.

Remedies for earache. The best home remedy for earache is the hot-water bottle, but a fair substitute is a hot brick or a hot flatiron wrapped in flannel, or a hot bag of salt. Remain quiet. Eat food that requires little chewing, as the large muscles which work the jaws are near the ear. If this does not give relief, call a physician.

Do not use sweet oil, laudanum, or patent eardrops. Oil becomes rancid and vile-smelling; laudanum is dangerous and should be used only on the advice of a physician; and all patent medicine should be avoided. No one can tell what harm it may do. Credit is often given to a remedy that has no value whatever, simply because it happened to be the one last used before relief came through some natural means.

Deafness. Deafness is sometimes inherited. In such cases it may be due to a malformation of some part of the auditory apparatus. More often it is caused by the Eustachian tubes becoming closed by catarrh, or eruptive diseases, such as scarlet fever and measles. It may also be caused by adenoid growths and colds. For complete loss of hearing there is no cure. No impairment

of hearing will result from most cases of eruptive diseases if judicious preventive measures are used by the physician in charge. Relief from partial loss of hearing, due to adenoid growths, may be obtained by a simple operation. Partial deafness from colds and catarrh may be prevented or relieved by care on the part of the individual, together with proper medical attendance.

Children with impaired hearing do not develop mentally as fast as those with normal hearing. It is impossible that this should be otherwise, since they are deprived of one of their most important avenues of obtaining knowledge. This condition is mistaken for mental deficiency by those who fail to recognize the real cause. Rapid mental development due to the restoration of hearing has many times been observed in children after the removal of adenoid growths. Teachers should give special attention to backward pupils, with a view to discovering, if possible, the cause of their lack of development.

QUESTIONS

1. Describe the ear.

2. Which part is most likely to freeze? How may the frost be removed?

3. Why is it necessary to be particular in washing the ears?

4. What is the ear drum? the drumhead?

5. Describe the auditory canal. How is it kept clean?

6. Why is it a bad practice to try to remove the wax by digging in the ear?

7. What is the right way to remove the wax if there is an excessive amount?

8. Why is dropping in oil harmful?

9. Why should the practice of wearing cotton in the ear be discouraged?

10. Why do solid particles which sometimes get into the ear do no harm?

11. Why should no alarm be caused if an insect should crawl into the ear? How may it be removed?

12. What is the principal office of the drumhead? Why will an injury to it often destroy the hearing?

13. How may the drumhead be penetrated, ruptured, or destroyed?

14. How may the hearing often be greatly assisted where the drumhead has been destroyed?

15. Describe the middle ear.

16. What are the Eustachian tubes? What is their office?

17. What is a "gathering in the ear"? How is it caused?

18. What is the cause of deafness? of earache?

19. How does nature effect relief? Describe what follows.

20. Outline a home treatment for earache.

21. What remedies should be avoided? Why?

22. Why is credit often given to a remedy which has no value?

23. In what ways may impaired hearing be caused? How may relief sometimes be obtained?

24. Why do children with impaired hearing not develop as rapidly as those with normal hearing?

25. For what is this kind of slow development sometimes mistaken?

26. Why does the removal of adenoid growths often result in improved mental development?

CHAPTER XVIII

TOBACCO AND HARMFUL DRUGS

Tobacco. *Objections to its use.* In spite of the very common use of tobacco there do not seem to be any good arguments in its favor, while against its use there are many. It contains a very poisonous substance, nicotine, which is absorbed into the system of those who chew or smoke it. Some persons are much more susceptible to nicotine poisoning than others, and some of the worst effects are sometimes produced upon those who use tobacco only moderately. The parts of the body which are most commonly affected are the stomach, the eyes, the heart, the arteries, and the nervous system.

Injurious effects. The first effect of the use of tobacco is felt in the stomach, as nearly every beginner can testify. Even those who have become accustomed to its use know the limit to which the stomach will allow them to go, and the hardiest smoker will usually hesitate about attempting a cigar just before eating.

The optic nerve, which leads from the brain to the eye, and upon which sight depends, is sometimes so sensitive to tobacco poisoning that partial blindness is caused. If the use of tobacco is stopped, the sight returns.

Excessive use brings on a nervous condition of the heart, known as tobacco heart. Even moderate use impairs

the action of the heart to such a degree as to compel all athletes to give it up while training for any important contest. The effect is usually noticeable in the breathing; smokers are short-winded. But the seat of the trouble is the heart, which is unable to pump blood to the lungs fast enough for proper oxidation during a period of unusual exertion.

Even more serious than the effect upon the heart is that upon the arteries. These slender tubes, which carry blood from the heart to all parts of the body, have elastic, muscular walls. They expand as they receive the blood at every beat of the heart. This expansion can be plainly felt even as far away from the heart as the wrist, where it is known as the pulse. Between the beats the arteries contract, smoothly and steadily forcing the blood along into the capillaries and preparing themselves for the blood which will come at the next heart impulse. This flexibility of the arteries is of the highest importance to the circulation of the blood and hence to the normal working of the other organs, for they all depend upon the blood. As old age comes on, the walls of the arteries gradually lose their elasticity and become hardened, and there is a general slowing down of the other organs in consequence. Hardening of the arteries is often induced in younger persons by improper living, which results in a premature old age. The two most common causes are tobacco and alcohol. So sensitive are the arteries to these two drugs that there is often a measurable change in the blood pressure after one cigar or a single drink. Premature old age means but one thing, an early death,—death at an age when one ought to be at his best.

Tobacco also has its effect upon the general nervous system. If a person is naturally phlegmatic, this effect may not be perceptible, but upon one who is naturally nervous it is marked and is never anything but harmful.

Effect upon the young. Tobacco has a worse effect upon young persons than upon those who are more mature. It diminishes the appetite for food, hurts the digestion, and thus hinders the growth of the body and of the brain. It dulls the senses, making the user less alert. Employers agree that boys who smoke are less efficient than others; many will not hire them if the fact that they smoke is known. The boy who learns to smoke is burdening himself with a habit that will surely prevent him from attaining his greatest measure of success.

Opium. Opium is a reddish-brown, sticky, gumlike substance. It is obtained from the milky juice of the unripe heads of a poppy growing principally in western Asia. It has a bitter taste and a peculiar odor. The laws governing its importation into the United States, and its sale, are very strict. It can be sold for medicinal purposes only. Complete records must be kept of all persons to whom it is sold.

Effects upon the system. Properly used, opium is one of the most valuable drugs known to medical science. It acts directly upon the brain, relieving pain and producing sleep. The after-effects are headache, nausea, constipation, languor, and loss of appetite.

The opium habit. Opium should be given only by a [illegible]r by a trained nurse, and its effects must be

most carefully watched, as some patients are more susceptible to its narcotic effects than others, and a slight overdose may produce death. A second dose should be given only in case of actual necessity. The opium habit is easily acquired and very difficult to leave off. It is one of the most baneful of all the habits known to the human race; therefore too much care cannot be exercised in its avoidance. It causes physical, mental, and moral degeneracy; and if the end does not come from an overdose, death finally ensues from slow starvation.

The principal forms of opium and preparations containing it are morphine, codeine, laudanum, heroin, and paregoric. In action and in effect they are all similar to opium, and the laws regulating their importation and sale are the same.

Cocaine. This drug is obtained from the leaves of a shrub growing in South America. If applied to the skin, it has no effect; but if injected into any part of the body, it acts as a local anæsthetic, preventing pain by paralyzing the nerves. It is used in minor surgical operations upon the eye and also in dentistry. The laws governing its sale are very strict.

The cocaine habit. If applied to the lining of the nose, mouth, or throat, cocaine stimulates the brain and produces a feeling of exhilaration. Repeated use in this manner induces the cocaine habit, which is at least equal to the opium habit in its harmful effects. Once the habit is fixed, the craving for the drug is so intense that the victim will do anything, even to committing crime, to obtain it. The remedy is to make it impossible for the

victim to obtain the drug. A long time may be required to overcome the habit. In some instances persons have returned to the use of the drug at the first opportunity after having been deprived of it for an entire year. The number of those addicted to its use has greatly decreased since the enactment of stringent laws limiting its sale.

The results of the cocaine habit are disturbances of the digestion; loss of flesh, of strength, and of ambition; mental delusions; and, finally, insanity.

QUESTIONS

1. What parts of the body are most commonly affected by tobacco?

2. How does tobacco affect the stomach?

3. What is the proof that partial blindness is sometimes caused by tobacco?

4. Why is it necessary for athletes in training to give up tobacco?

5. What is meant by hardening of the arteries? Of what age is it characteristic?

6. How may hardening of the arteries be caused in younger persons?

7. What is the effect of tobacco upon the nervous system?

8. Why is it especially important that young persons should not use tobacco?

9. Describe opium. How is it obtained?

10. What restrictions are placed upon its sale in the United States?

11. What are the effects of opium upon the human system?

12. Why should opium be given only by a physician or by a trained nurse? Why should it be given only in case of actual necessity?

13. What are the effects of the opium habit?

14. What are the principal forms of opium?

15. What is the source of cocaine?

16. How does it act if injected into any part of the body? For what is it used?

17. What are the effects if applied to the lining of the nose, mouth, or throat?

18. How is the cocaine habit acquired?

19. How does cocaine compare with opium in harmful effects?

20. How can the cocaine habit be overcome?

21. What has caused a decrease in the number of those addicted to the use of cocaine?

22. What are the final results of the cocaine habit?

CHAPTER XIX

ALCOHOL AND PATENT MEDICINES

Alcohol. The effects of alcohol upon the human system have been investigated many times, and much has been published concerning these investigations, — so much, in fact, that it will be impossible here to do more than give a summary of the findings that are beyond controversy. It is enough to know the facts.

Alcohol shortens life. Investigations carried on in England have proved that the death rate of drinkers is much greater than that of the total population. Records of life-insurance companies of England, Scotland, and the United States show that the death rate of those who drink moderately is from 40 to 50 per cent higher than of those who do not drink at all. This means a reduction of about four years in the average lifetime of the moderate drinker. Those who are known to be hard drinkers are such bad "risks" that they cannot get insured at all.

It causes many diseases. All the internal organs may suffer injury from alcohol. Abundant proof of this has been furnished by examination of these organs after death. The stomach, liver, kidneys, heart, and arteries have each a special disease due to the use of alcohol. These diseases are described in every handbook of practical medicine.

It diminishes the power to resist infection. In protecting the body from infectious diseases the white corpuscles of the blood are greatly assisted by the secretions of certain internal organs, the principal of which are the thyroid glands and the adrenals. Alcohol causes a degeneration of these organs. Their secretions diminish, and the body loses much of its resisting power. Those who drink large quantities of alcohol are the most likely to contract contagious diseases and the least likely to recover from them, tuberculosis and pneumonia being especially fatal.

It causes intoxication. The action of alcohol upon the system is similar to that of ether, the principal difference being that alcohol acts more slowly. The effect of each is to paralyze the nerves. As alcohol is self-administered, a state of complete unconsciousness is rarely reached.

Owing to this paralyzing effect the following results may be observed. Intoxicated persons see poorly; sometimes they see double. They are unable to speak plainly. Walking is difficult, sometimes impossible. The hands are clumsy. The stomach is affected, causing vomiting. The memory is poor, and the thoughts are confused. Judgment and reason are gone. There is a temporary condition of insanity. After intoxication there is a general depression of the whole nervous system, making a person morose and disagreeable.

Frequent intoxication results in a disease of the nervous system called *delirium tremens*. The victim becomes raving mad and must be restrained. In his

imagination he often sees himself surrounded by or pursued by loathsome beasts. If he does not give up drinking, the result is a most agonizing death.

It causes insanity and crime. Intoxication, insanity, and crime are closely associated. Intoxication is temporary insanity. Repeated intoxication produces changes in the brain which result in permanent insanity. The truth of this is amply attested by the large number of inmates of insane asylums, who, previous to their insanity, were confirmed alcoholics. In some asylums, where investigations have been made, the number of such inmates has been found to be from 40 to 60 per cent. It is difficult to determine just how much crime is due to alcohol, but there is authority for the statement that more than half of the crimes are committed by persons who are more or less under its influence.

Effect upon heredity. The study of heredity as applied to alcoholism has led to some startling discoveries. The effects of intemperance are not confined to the individual, but are handed down to his descendants as an evil legacy. Idiots, epileptics, beggars, paupers, drunkards, and criminals occur with an alarming frequency among the descendants of confirmed alcoholics, and in extreme cases hundreds of such unfortunates have been found in tracing a single genealogy.

Patent medicines. Most patent medicines are worthless. Those who buy them get nothing for their money, or worse than nothing, because many of them contain habit-forming drugs. No other class of swindles is so effective in deceiving and robbing the poor. Their

promoters circulate elaborate advertisements, with lists of symptoms intended to work upon the imagination and to make people believe they are the victims of diseases which they do not have. They also arouse false hopes in those who are really sick by claiming to cure diseases which are baffling to the most expert physicians. To appreciate the absurdity of such claims one has only to observe that they offer easy cures for cancer, — a disease for which a cure has been sought in vain by scientists of the highest training, with every means at their disposal that money could afford.

Dangerous powders. Of all the quack medicines, headache powders are the most widely used. They are also the most dangerous, both in their immediate effects and in those that follow. Some patent remedies are harmless fakes, but headache cures are not, for to acquire a ready sale they must stop the pain. To accomplish this with any degree of certainty a powerful drug is needed. This drug is usually acetanilide, which relieves pain temporarily by depressing the heart. Often the pain returns when the effect of the drug wears off, furnishing the incentive for another dose. Powder after powder may thus be taken, until the drug seems to be a necessity, while the condition of its victim becomes gradually worse. The habit formed in this way is very difficult to break and frequently ends in permanent injury to the health, if not in death.

Repeated doses of acetanilide weaken the heart. An overdose has many times proved fatal, and death has sometimes resulted from the regular patent-medicine

dose. It should be used only with the consent of a physician who understands its true nature.

Other remedies to be avoided. Some of the other highly advertised remedies to be avoided are digestive tablets, cough sirups, and hair restorers; also cures for catarrh, consumption, deafness, eye troubles (without glasses), obesity, kidney diseases, tumors, and cancer. The ailments and diseases referred to here are too serious to be trifled with. They offer difficulties enough to the trained and experienced physician, and yield only to the most scientific treatment. The doctor at least understands the symptoms of the disease he is treating and the nature of his remedies. Those who use patent medicines do not understand either of these. They are taking an unknown remedy for an unknown disease.

QUESTIONS

1. What is the evidence that alcohol shortens life?
2. What internal organs are subject to special diseases caused by alcohol?
3. Explain how alcohol diminishes the power to resist disease.
4. What is the nature of intoxication?
5. What are the immediate effects of intoxication? the after-effects?
6. What disease is caused by frequent intoxication? What is the nature of this disease?
7. What is the evidence that alcoholism causes insanity? that it causes crime?
8. What classes of unfortunate persons occur with frequency among the descendants of confirmed users of alcohol?

9. Why are most patent medicines worse than useless?

10. What class of people are most often deceived by them? Why?

11. By what methods do the promoters of patent remedies get customers?

12. What illustrates the absurdity of the claims of those who have patent medicines to sell?

13. What powerful drug do most headache powders contain? How does it act? What results sometimes follow its use?

14. Give a list of highly advertised remedies to be avoided.

15. Why should they be avoided?

CHAPTER XX

BACTERIA

Importance of bacteria. Bacteria are minute living organisms, so small that they cannot be seen by the unaided human eye. They occur in dust, dirt, soil, air, and water; on our hands, clothing, and food; in our mouths and intestines, — in fact, nearly everywhere. They are the cause of decay, and play an important part in various other natural phenomena. They also cause many diseases and hinder the healing of wounds.

Conditions under which they thrive. Bacteria thrive and multiply with almost incredible rapidity wherever there is moisture, food, and a suitable temperature. Whenever the food or moisture fails, or the temperature becomes unsuitable, their growth is stopped. To tide over such a period of unfavorable conditions, and to preserve some of the bacteria, spores are formed. The spore is a resting stage in which the living matter may remain dormant for many years even under extremely adverse conditions.

Effects of adverse conditions. Bacteria differ greatly as to the effect of dryness, but most kinds are killed by exposure to drying for a few hours or a few days at most. Spores are more resistant. Some will germinate after remaining dry for ten years. Direct sunlight kills bacteria, sometimes almost instantly. Diffuse daylight

and even the electric light hinders them. Spores are especially sensitive to light.

Most disease-producing bacteria thrive best at about the temperature of the human body, and all bacteria do best within a limited range of temperatures; but their ability to adapt themselves to a wide range of heat and cold is remarkable. Some kinds can grow and multiply at a few degrees above freezing, while others can do the same not far below the boiling point of water. As a rule, all the bacteria in water are killed if it is brought to the boiling point. This is not true of spores, for some of them can stand boiling for several hours. On the other hand, bacteria are more resistant to cold than to heat. Most bacteria are killed if they are in water that freezes naturally; but this is not true of all of them, and they can be subjected to dry cold far below the freezing point for days without impairing their vitality.

As to the oxygen requirements of bacteria, there is a wide divergence. Some kinds require free oxygen, while others live and grow only where it is almost entirely absent.

Antiseptics and disinfectants. Many kinds of chemical substances are used to check the action of bacteria or to destroy them. They are called antiseptics and disinfectants. They differ principally in their strength and in the uses to which they are put. Antiseptics are milder in their action and are applied to the surfaces of the body to check the action of the bacteria. Disinfectants are stronger and are used where it is desired to destroy the bacteria, as in sick-room utensils.

Examples of *antiseptics* are alcohol, tincture of iodine, hydrogen peroxide, and weak solutions of sylpho-nathol and of carbolic acid. The best of these for home use is tincture of iodine. It can be applied with safety to cuts, scratches, and ordinary simple wounds. A small vial of it should be in every household, ready for immediate use. It can be applied with a small brush or, better, with a piece of absorbent cotton twisted around the end of a toothpick or a match. Hydrogen peroxide does not keep well after it is opened, and sylpho-nathol and carbolic acid require too much skill in their use.

Examples of *disinfectants* are chloride of lime, formaldehyde, corrosive sublimate, sulphur dioxide, and stronger solutions of sylpho-nathol and carbolic acid. (For the uses of disinfectants see Chapter XXI, p. 140.)

Both antiseptics and disinfectants are poisonous and should never be taken internally.

Ptomaines and toxins. Many bacteria, in the course of their growth, give rise to substances that are poisonous. The poisons produced in meat, fish, cheese, etc. by the action of the bacteria of decay are called ptomaines. Cooking such partly decayed food kills the bacteria but does not remove the poisons already formed. Poisons produced in the living body by the bacteria of disease are called toxins. These bacterial toxins are far more deadly in their effect than any other known poisons.

Antitoxins and vaccines. Some persons do not contract a disease, no matter how much they are exposed to it; this is called natural immunity. Others acquire immunity by having the disease; they seem to develop

within themselves a power to resist any further action of the bacteria or of their toxins. Investigators have discovered harmless methods of producing a similar kind of immunity in those who have not had the disease. This is done by introducing into the body certain classes of substances which are able to resist the toxins or which cause the body to develop its resisting power. These substances are called antitoxins and vaccines. An antitoxin is the blood serum (fluid remaining after clotting of blood) drawn from immunized animals. It contains *antibodies* which are able to neutralize toxins. Vaccines, unlike antitoxins, do not contain antibodies, but stimulate the growth of antibodies in the system into which the vaccines are introduced.

QUESTIONS

1. What are bacteria?
2. Where do they occur?
3. In what ways are they useful?
4. In what ways are they harmful?
5. Under what conditions do they thrive best?
6. What are spores? When are spores formed?
7. What is the effect of dryness upon bacteria? upon spores?
8. What is the effect of sunlight upon bacteria? upon spores?
9. What is the effect of high temperatures upon bacteria? upon spores?
10. What is the effect of low temperatures upon bacteria?
11. How do bacteria differ as to their oxygen requirements?
12. What are antiseptics? disinfectants?

13. Give examples of antiseptics. Which of these is best for home use?

14. Give examples of disinfectants.

15. What precaution is necessary in regard to both antiseptics and disinfectants?

16. What are ptomaines? How are they produced?

17. What are toxins? How are they produced?

18. What is meant by *natural immunity*?

19. How may artificial immunity be produced?

20. What are antitoxins?

21. How do vaccines differ from antitoxins?

CHAPTER XXI

EMERGENCIES [1]

Shock. Shock is a very common condition resulting from accidents, and its detection and treatment are very important. It is a depression, more or less profound, of the nervous system. A person who has sustained a railway or machinery accident, or a bad burn or other injury, or has been suffocated or poisoned, is liable to suffer from shock.

The onset of the symptoms is likely to be unnoticed unless looked for. There is either a stupid condition, in which the patient shows no interest in what is taking place about him, or a partial (in some cases complete) unconsciousness. He lies breathing feebly, with face pale, pinched, and anxious, eyelids drooping, eyes dull, and pupils dilated; the pulse is feeble, usually rapid, and sometimes absent at the wrist; the skin is cold, and there may be shivering; sometimes the mind wanders. These symptoms may follow a slight injury like a crushed finger; and again, they may be absent, or only present in a slight degree, after the severest accident. The amount of shock depends not so much upon the nature of the accident as upon the temperament of the individual. In most cases

[1] From "Handbook of the Society for Instruction in First Aid to the Injured" (with slight alterations).

reaction will take place in a few hours; in others no reaction takes place, and the person dies from heart failure.

Treatment. A great deal can be done to relieve a person suffering from shock. If there is severe bleeding, it must be stopped, and any wound or fracture may receive a quick dressing; but no attempt to do more than this to the injury should be made until after attending to the shock. In shock from suffocation or poisoning, treatment for the shock may be given at the same time with the treatment for the primary condition.

Place the patient in a horizontal position, the head slightly lowered; give a few swallows of cold water and repeat the dose occasionally, but do not allow more than one glass if there is severe bleeding.

Wring out cloths from hot water and lay them on the bared chest and abdomen; then cover the patient with a blanket to keep in the heat. Place hot-water bottles, hot bricks, or anything hot along both sides of the body and legs, inside the thighs, and under the armpits.

In using hot-water bottles or hot bricks, care must be taken not to burn the patient. This danger may be obviated by wrapping the bottle or brick in cloth before applying it, or by inserting it in a flannel bag.

Rub the body and limbs vigorously with the hand or with hot, dry cloths. To warm and stimulate the patient in every way is the object of the treatment.

Contusions. The simplest injury is the ordinary contusion, or bruise, caused by a fall or a blow. This consists of the rupture of small blood vessels under the unbroken skin, causing the familiar black-and-blue marks.

Treatment. Lay over the bruise a cloth saturated with hot water, or with half water and half alcohol or any of the household remedies that contain alcohol. Hot applications diminish pain and hasten absorption of the blood. Often no treatment at all is needed.

Sprains. A sprain is the result of violent twisting, stretching, or partial tearing of the ligaments about a joint; at the same time, especially in sprains of the ankle, there is often a fracture of the ends of the bones. There is no apparent deformity, like that of a dislocation or fracture, until swelling takes place. Severe pain, greatly increased by movements of the joint, accompanies this injury.

Treatment. If possible, place the injured joint in water as hot as can be borne, and keep the water hot for an hour or longer by adding hot water as fast as it cools; or an ice bag may be applied and kept on for several hours. Then apply cotton batting over the joint, and bandage with moderate firmness in such a manner as to limit movement of the joint. The injured joint should be maintained in a somewhat elevated position. After a day or two of rest, moderate use of the joint will prevent the stiffness that follows too long use of splints.

Dislocations. If one bone is displaced from another at a joint, the injury is called a dislocation. The ligaments that hold the joint in place have been torn, and there is pain, deformity, and stiffness. Dislocations cannot always be distinguished from fractures near the joint; for this and other reasons it is inexpedient for the unskilled to touch a supposed dislocation unless it is

absolutely necessary to do so, as in cases where it is impossible to obtain a physician.

Treatment. The best way to treat the majority of dislocations is to make the sufferer as comfortable as possible, lay a wet cloth over the affected joint, and wait for skilled aid.

Fractures. A fracture is a broken bone. Fractures are either *simple* or *compound.* In a simple fracture there is no wound leading down to the break. When there is such a wound, the fracture is called compound. In compound fractures the ends of the broken bone may be driven through the skin, as by a fall, or the skin may be broken by a blow or by a bullet. A compound fracture is much more serious and dangerous than a simple fracture, because of the liability of infection which in a simple fracture is prevented by the unbroken skin.

Treatment. If a fractured limb is suspected, let the patient lie down in as comfortable a position as possible. Then very gently and slowly remove enough clothing to expose the injured part, cutting or ripping with knife or scissors if necessary. If the limb is found very visibly deformed, try to straighten it by grasping the limb below the deformity and pulling gently and steadily in a straight line with the limb. Support the limb in its corrected position, lay a cloth wet with cold water over the injured part, and wait for the arrival of skilled assistance. There is no need for hurry in setting a fracture.

Bandaging. In hospitals and in the doctor's office the roller bandage is the kind most frequently used, but in an emergency it is seldom at hand, while a triangular piece

of cloth can always be obtained. The roller bandage is neater and for certain purposes better than the triangular, but the latter is equally serviceable for an emergency case, and less skill is required in its application.

The triangular bandage. This bandage is a triangular piece of any suitable material, — preferably unbleached cotton cloth. It is made by cutting a piece of the material forty inches square into triangular halves or by folding it in the same form without cutting it. The longer border is called the lower border; the others, the side borders. The upper corner opposite the lower border is named the point; the two other corners, the ends. For use it may be folded either broad or narrow. Spread out the bandage, — the lower border next you, the point farther away. Carry the point to the lower border. Fold it lengthwise toward you twice for the broad bandage, three times for the narrow.

The triangular bandage is used for the same purposes as the roller bandage: namely, to keep dressings of wounds in place, to fix splints, and to protect and support any part of the body.

The roller bandage. A convenient roller bandage is made by tearing from a piece of unbleached cotton cloth or other similar material a strip three inches wide and four yards long, and then rolling this strip into a compact roll.

If a narrow bandage is required, it is only necessary to cut one of these rolls in two with a sharp knife and thus obtain a bandage of any width up to three inches.

Applying the bandage. To apply the bandage, hold the roll in one hand and the loose end in the other, and

lay the outer side over the part to be bandaged. As long as the part is of the same size, carry the bandage round and round, but when it is tapering, it will be seen that if the bandage lies flat there will be spaces left. To avoid these spaces, the thumb of the free hand is placed on the lower edge of the bandage, to keep it in place, and the roller, held in the other hand, is turned half over. Then again proceed around the limb. Repeat this movement each time the bandage goes around the limb, and it will lie flat.

The bandage is fastened by pins, by sewing, by a piece of adhesive plaster, or by splitting the end a few inches, carrying one half around the part to meet the other, and tying them together.

Great care should always be taken not to apply the bandage too tightly. If it is too tight, the parts of the limb below the bandage will become blue, swollen, and cold, and either numb or painful. If the bandage is not loosened or removed, gangrene may occur in the parts.

Drowning. Remove a body at once from the water. Do not fear the coroner.

Persons have been known to recover after prolonged submersion and hours of insensibility. Therefore do not despair of restoring life even in the most desperate cases, and do not give up trying unless death is absolutely certain. That the unpracticed observer cannot detect a pulse or heart sounds is no proof that life is extinct.

The treatment must be carried out on the spot, except in extremely severe weather, when it is permissible to remove the body to a place of shelter if it is near.

Send immediately for a doctor, blankets, and stimulants. Quickly open up all clothing about the neck, turn the patient on the face, clasp your hands together beneath the stomach, and lift as high as possible, letting the head hang down so that the water can run out. Hold the body in this way for a few seconds, then turn the patient again on the back. Wipe out the mouth and back of the throat with your finger covered with one or two thicknesses of a handkerchief.

If breathing has not commenced, certain simple means may be tried, in order to excite natural respiration. Give the patient several severe slaps on the chest with the open hand. Tickle the nose with a feather or a straw. Dash cold water on the face and chest. If natural breathing is established by these procedures, continue the treatment as described under " Restoration of warmth and circulation."

The above measures must be tried quickly, and if these are not successful, artificial respiration should be resorted to immediately.

Artificial respiration.[1] Lay the patient on his back with a rolled-up coat, or something similar, under his

[1] The Schäfer method of artificial respiration as described in *Monthly Health Letter No. 27* of the Life Extension Institute, Inc., of New York is simpler than the method described above and is preferred by many. " Turn the body on face with jacket rolled up under abdomen, compress sides of chest from behind, and force water from lungs. Seize tongue with handkerchief and pull forward to clear throat. Be deliberate, but persevering and methodical. Kneel over patient and slowly press in the sides of chest while counting one, two, three. Release chest and repeat this procedure rhythmically to correspond to slow, deep breathing."

shoulders. Then draw the tongue forward and out of the mouth, as otherwise it will fall back into the throat and impede the breathing. This is very important. If there is someone to assist you, let him grasp the tongue with a dry handkerchief, to prevent its slipping from the fingers; or he may cover his fingers with sand for the same purpose. He should kneel on one side of the patient, holding the tongue out in such a manner as not to have his hand and arm interfere with the movements that are to be described. If alone, draw the tongue well out and tie it against the lower teeth. To do this, lay the center of a dry strip of cloth on the tongue, cross it under the chin, carry the ends around the neck, and tie them at the side of the neck. Do not attempt to tie anything around the tongue, as it will probably slip off. Another way to hold the tongue out is to slip over it and under the chin an ordinary rubber band.

Having thus quickly adjusted the position of the tongue, kneel behind the patient's head, grasp him by the forearms near the elbows, draw his arms up and over his head, and pull very strongly and steadily for three seconds, getting a purchase if necessary by bracing your foot against his shoulder. This motion draws the ribs up, thus expanding the chest, and air enters. The arms are held back thus for three seconds, to allow the air sufficient time to completely fill the lungs.

Now reverse the first movement; that is, carry the arms back until they rest against the sides of the chest, the forearms below on the abdomen. Press the forearms firmly downward and inward against the abdomen for two

seconds. This pushes up the diaphragm, depresses the ribs, contracts the chest, and forces the air out.

Then again perform the first movement of drawing the arms back, and repeat the movements regularly and persistently at the rate of sixteen times per minute until the patient makes some effort to breathe. This effort may be only a gasp; wait a moment, to see if he will breathe again; if he does not, again perform artificial respiration, but now endeavor to time the movements by his efforts to breathe; also, at this time, again resort to dashes of cold water and slapping, until gradually respiration is established.

Even though there is no sign of life, artificial respiration should be continued for an hour and a half or until a doctor has pronounced life extinct.

In the successful performance of artificial respiration the air must be heard entering and leaving the chest. If this is not heard, either there is some obstruction in the throat, such as some foreign substance or the tongue falling back, or else the movements of the arms are not properly performed. These should be made deliberately and with considerable strength.

Restoration of warmth and circulation. During and following these attempts to restore respiration, treatment similar to that for *shock* should also be employed. Let assistants place hot-water bottles or warm bricks along each side of the body, on the pit of the stomach, between the thighs, and at the soles of the feet. At the seashore dry bathing clothes that have lain in the sun, or hot sand from the beach, may be used. Have the body and limbs

vigorously rubbed with the hands or with warm, dry cloths. Continue to use friction and all kinds of warmth until life is fairly restored. As soon as the patient can swallow, give hot drinks, — tea or coffee or hot water. If there is persistent difficulty in breathing, a large mustard plaster should be applied to the chest.

Suffocation from other causes. If a person has been in a room with the gas turned on unlighted, or in a room full of charcoal gas or thick with smoke, or in a sewer, an old mine, or a well full of poisonous gases, or has been hanged or choked, the result is similar to that from being under water. He has suffocated because air has been prevented from reaching the lungs.

Treatment. Immediately remove the patient from the source of suffocation. If hanging, cut him down. Do not fear the coroner. If obliged to enter a room filled with smoke or gas, take several full breaths of fresh air before entering, and then creep along the floor to the windows and throw them wide open. Take more long breaths at the window, and then drag the suffocated person from the room.

In rescuing a person from a sewer, a mine, or a well, the method is similar, but the rescuer should have a rope tied beneath the arms, by which he may be drawn out if necessary.

Treat these cases of suffocation exactly as for apparent drowning, — by artificial respiration and the measures for *shock*, — except that, there being no water in the lungs, measures for removing this are not necessary.

Choking. All sorts of things get into the throat, especially with children, and cause suffocation. The sufferer turns purple in the face; the eyes protrude; he throws his arms about and sometimes falls unconscious. In other cases the foreign body lodges in the larynx or the windpipe, causing great distress and violent coughing.

Treatment. Slap the patient violently on the back, or stand him up face to the wall, his chest resting against it, and give him a severe blow between the shoulders. If the patient is a child, place one hand on each side of the chest and squeeze it vigorously and suddenly; or hold the body with the head hanging down and slap the back while in this position. If something is supposed to be in the throat, perhaps a piece of meat, try to grasp it by thrusting the thumb and forefinger down as far as possible, or try to hook it out with the forefinger. If the breathing is not seriously interfered with, it is best to wait for medical aid; for interference may increase the difficulty, and in many cases the offending body has passed down, leaving only an irritation that is mistaken for its actual presence.

When a child has swallowed a button, coin, or any similar thing, do not give oil or other purgatives; if he is simply let alone, it is more likely to pass from his bowels without trouble than when driven through by the aid of purgatives. In case the object swallowed is sharp or angular, the stomach and intestines may be protected from injury by giving the patient rye bread, potatoes, and cheese to eat.

Fainting. The pale, bloodless face of the person who has fainted is well known; it is the indication of a like bloodless state within the brain. The action of the heart has been temporarily weakened, and this causes a diminution of the blood supply to the brain. This is followed by loss of consciousness. The pulse is slow, feeble, and sometimes absent.

Treatment. The fainting person must not be supported in an upright position. Lay him down at once; if on a sofa, let the head hang over so that it may be lower than the body, and raise the feet on pillows; this position allows the heart to send blood to the brain more readily. Expose the face to cold air, sprinkle it with cold water, and hold ammonia or smelling salts to the nose. If the faint continues, the case may be treated like one of *shock*. The one great thing to remember is that the person who has fainted is to be laid down flat and the feet raised to increase the flow of blood to the head.

Stunning, or concussion of the brain. If a person receives a severe blow on the head, or falls on the head, he is stunned, or has sustained a more or less severe concussion of the brain. He is stupid, confused, sick at the stomach, often vomits, lies pale and shivering, sometimes faints, and is more or less insensible, according to the severity of the injury.

Recovery is usually rapid, but the after-effects sometimes last a long time.

Treatment. Place such a patient in a cool, quiet, dark room, on the back, with the head slightly raised; unfasten

any clothing that is tight about the neck or waist. If the patient shivers or seems faint and cold, apply heat to the body as described under "Shock." Do not give stimulants in any head injuries. After the first shock has passed away, apply ice to the head.

Heat-stroke, or sun-stroke. Prolonged exertion in a heated atmosphere is likely to cause this, either with or without exposure to the sun's rays. It is preceded by symptoms that should serve as a warning, — headache, a sense of weakness at the pit of the stomach and weakness of the knees, and sometimes vomiting and disturbed vision. These symptoms may gradually merge into unconsciousness or the patient may lose consciousness suddenly, without warning. The face, head, and body are burning hot and dry. This intense, dry heat of the body is the characteristic condition in heat-stroke. The face itself is red and flushed. The pulse is full and rapid. Convulsive twitchings of various parts of the body are frequently observed.

Treatment. The object of treatment is to reduce the heat of the body. Strip the patient, wrap the body in a sheet, and keep the sheet wet with cold water by frequent sprinkling; continue this until consciousness returns and the body feels cool. If consciousness is again lost after having been recovered, the cold-water treatment must be repeated. When it is impracticable to follow out the above treatment immediately, put cloth wrung out of ice water (or the coldest water to be had) on the head, the back of the neck, and the hands. But do not sacrifice a life for modesty's sake.

Hemorrhage, or bleeding, from wounds. To stop bleeding from any external wound, wherever situated, first let the patient lie down, then cut away or remove the clothing, as much as necessary to expose the wound fully, and raise the part wounded as high as possible. This alone will sometimes check bleeding if the vessel wounded is a small one or is a vein. If it does not, then make a compress by folding any clean cloth, as a clean handkerchief or two, or a piece of shirt or skirt, or, preferably, a piece of sterile gauze or absorbent cotton, into a rather thick, even pad somewhat larger than the wound. Place this over the wound and bind it on tightly with a handkerchief, a strip of cloth, a pair of suspenders, or anything that can be used as a bandage. Then watch for a few moments, and if blood continues to flow freely through or around the compress, apply another compress over the first and bind on still more tightly, or make steady and continuous pressure with the fingers on the compress.

If the wound is in a limb and still continues to bleed freely, apply a tourniquet (to be presently described), keeping the limb still elevated. Do not, however, use a tourniquet until the compress and bandage have first been carefully tried. A tourniquet may be very painful and may even do harm. It is often needlessly applied for bleeding that a compress and bandage or finger pressure would easily control.

The tourniquet. Take a handkerchief, a towel, a strip of strong cloth, a pair of suspenders, or any similar material, wind it loosely one or more times about the limb

between the wound and the body, and tie the ends together. Place a small, smooth, round stone, apple, potato, or wad of cloth, or anything similar at hand, under the bandage between it and the skin and over the seat of the main artery of the limb. Then pass a cane, an umbrella, a ruler, a stick, or a rod of any kind under the bandage on the other side of the limb and twist the bandage with the rod until the stone or wad is pressed firmly into the limb and the bleeding stops. The tourniquet may be left in place until the physician comes, or, if very painful, it may be very slowly relaxed at the end of half an hour, but must be tightened again if the bleeding recommences.

If the position of the main artery of the limb cannot be remembered, apply the tourniquet without the stone or wad.

Bleeding from the nose. This is seldom serious and will usually stop of itself in a few minutes if let alone. Often it is nature's way of relief from some internal condition.

Treatment. Do not blow or wipe the nose. See that there is nothing tight about the neck. Supply an abundance of fresh air. Keep quiet, either sitting or standing, with head slightly bent forward. Apply something cold to the bridge of the nose and to the back of the neck. Breathe in cool air through the nose and breathe out through the mouth. If the bleeding does not stop, the following measures may be tried, one after another:

Put the hands into a basin of water as hot as can be borne.

Sniff ice water up the nose a few times, and then hold the nostrils closed with the fingers for five minutes.

If these measures fail, summon a physician, informing him of the nature of the trouble when doing so.

Wounds. The immediate treatment of accidental wounds is as follows:

If the wound is bleeding severely, treat as described under "Hemorrhage."

If the bleeding is not severe, simply wipe away any blood or loose clots on the surface, without disturbing the wound, using a piece of sterilized gauze or cotton or the cleanest material obtainable. If the wound stands open, draw the edges together as well as possible, using pieces of the same material and not touching the wound with the fingers. Apply over the wound a good-sized pad of the same material, and bandage it firmly in place with a handkerchief or any extemporized bandage.

If the patient is where no surgical help can be obtained, the dressing may remain on the wound until it is healed, unless it discharges or becomes painful; in this case the dressings are to be changed every day or oftener, and the wound washed by pouring sterilized water over it.

The simple sterilized dressings necessary to close most accidental wounds are nowadays carried by every soldier in action, and should be kept in every house, shop, factory, railway station, train, and camping outfit. They can be bought at any drug store for a few cents. They can be extemporized by boiling for a few minutes any sort of material that will serve as a dressing.

Healing of wounds. There are two ways in which a wound may heal. The most desirable and quickest is by *first intention*, or *primary union*. If this takes place, only a short time is required and but a fine scar is left. This is accomplished when the wound is kept quiet and protected from injury, and when there are no impurities in the wound, that is, when *asepsis*, or freedom from germs, has been obtained and preserved.

If a wound does not close by first intention, it heals slowly by *second intention* (that is, with formation of granulations), and finally leaves a large scar. This occurs when so much of the skin has been destroyed that the edges of the wound cannot be brought together, when the wound is disturbed, when blood collects in it, forcing it apart, or when the wound is dirty, that is, when asepsis has not been preserved.

Little cuts, pricks, and scrapes should always be treated carefully, for blood poisoning may result from the most trifling wound. As soon as bleeding stops, apply tincture of iodine or wash thoroughly with alcohol. Many slight wounds need no other dressing.

If a little cut stands open, it may be brought together with a piece of surgeon's plaster through the middle, but never cover any wound entirely with plaster. Over this, or over any slight wound to protect it, may be placed a small sterilized pad held in place by a finger cot or bandage.

Infected wounds. Wounds that have been contaminated may become red, swollen, and painful and may give rise to fever. Germs are then present, and the wound is said to be infected, or septic. In such cases all dressings must

be removed; the wound must be opened if necessary, and must be thoroughly washed out with sterilized water or peroxide of hydrogen and dressed every few hours with wet, sterilized compresses. A physician should see the case immediately if possible. Always inform him of the nature of the trouble.

Little cuts and scratches that discharge may be washed with the peroxide and dressed twice a day with borated vaseline or zinc ointment, to keep the dressing from sticking.

Dog-bites. A dog-bite is often only a trifling thing, and the fright that it causes is usually not warranted. It should be treated like any lacerated wound. It is well, however, in all cases, to consult a physician as soon as possible; and if there is any suspicion that the dog has rabies, or is "mad," or even if it is sick in any way, this should be done at any cost or trouble. The Pasteur treatment, begun within a few days after the bite of a rabid animal, is an almost certain preventive of the development of rabies.

A dog that has bitten anyone should never be killed until it has been shut up and watched for ten days, to see if it develops rabies. It is best to put the dog in the care of a veterinary surgeon. If the dog has been killed, send the head or the whole body to the health authorities for examination. The popular belief that the prompt killing of the dog will prevent the possible development of rabies in the person bitten is erroneous.

Other animals may have rabies and communicate it to human beings.

Poisons and poisoning. A poison may be defined as a substance which, when taken into the body, causes illness or even death.

Treatment. In all cases of poisoning, of whatever nature, the very first thing to do is to give liquids to dilute and neutralize the poison in the stomach, and at the same time to empty the stomach. To do this, give the first harmless thing to drink that you can lay your hands on, and plenty of it, — glass after glass, — until the patient vomits. The more disgusting and nauseating the drink is, the better; give soapy water, dishwater, lukewarm water, sweet oil, milk, raw eggs, even cold water if nothing else is at hand. As quickly as possible give, in a glass of warm water, a tablespoonful of dry mustard, or a teaspoonful of salt, or a tablespoonful of wine or sirup of ipecac. If not immediately successful in producing vomiting, push the forefinger as far down the throat as possible and keep it there until the patient does vomit. Something should be placed between the teeth to prevent being bitten.

In any and every case of poisoning, never cease your efforts until free vomiting has taken place. Repeat the drinks, the use of the forefinger, and, if necessary, the emetics until you are sure the stomach is empty. If the stomach is repeatedly filled with warm water and repeated vomiting takes place, it may be as thoroughly washed out as by the use of the stomach tube.

In all cases of poisoning, keep up the efforts to produce vomiting until the stomach is completely emptied; then give two tablespoonfuls of castor oil to empty the bowels.

All poisonings require professional care. If a physician is not obtainable, and evidences of shock appear, the treatment for this must be carried out.

Antidotes. An antidote is a substance that tends to neutralize a poison or its effects.

If an acid has been taken, give, as an antidote, a mild alkali to neutralize the acid, — limewater, cooking soda, magnesia, or plaster scraped from the walls and stirred in water; if an alkali has been taken, give a weak acid, — lemon juice or a tablespoonful of vinegar in water. If carbolic acid has been taken, give Epsom salts in warm water, then the whites of several eggs mixed with water, or large quantities of milk. If it is a case of opium poisoning, after emptying the stomach keep the patient walking up and down, meanwhile slapping him with a wet towel. Give half a pint or more of strong black coffee by the mouth or by injection into the rectum if the patient cannot swallow. On no account allow him to fall asleep, but do not exhaust the patient by the means employed to keep him awake. If, in spite of all efforts, the patient seems to be sinking and the respiration is failing (that is, becoming slower than five or six a minute), begin artificial respiration and continue it for hours.

Burns. Burns may be caused by contact with flames, hot metals, hot liquids, steam, or chemicals. Burns are dangerous in proportion to their depth and extent. The skin may be simply reddened or it may be blistered or charred. Burns that cover a large surface are apt to be fatal, especially in children, and shock is common after severe burns.

If a person's clothes are on fire, throw him down, wrap him in anything woolen that may be at hand, — a blanket, a rug, or a coat, — and roll him about until the flames are extinguished; then pour water on the burning parts until the last spark has disappeared.

The clothes must be carefully cut away with sharp scissors. If any part of the clothing adheres to the flesh, do not attempt to remove it. In severe burns the patient may be put, clothes and all, into a warm bath, and the clothes removed while there.

Treatment. Slight burns or scalds should be treated by covering them with clean cloths wet with a warm solution of washing or baking soda, made by putting into the water as much soda as it will dissolve. Keep the dressing wet with this until all pain is gone. Then dress with boric-acid ointment or vaseline, or paint with collodion.

A severe burn[1] is eminently a case for the care of the physician, who should be called immediately. An important part of the management of a burn is the treatment of the accompanying shock.

Exposure to cold and frost-bite. Exposure to cold may cause a general chilling of the whole body, resulting in depression, insensibility, and death. Chilling may take place insidiously and without the person being aware of

[1] In case of a severe burn it is best to limit the treatment to the soda solution until the physician arrives. The oily, sticky dressings which were formerly used are not recommended. Not being sterile, they may lead to serious infection; and they will always be removed by the surgeon to make way for the modern paraffin treatment. Removing sticky cotton and lint from a burned surface is a very painful operation.

it, even when the cold is not intense. This is especially liable to occur during exhaustion by overwork, long marches, or starvation, and in those whose vitality is lowered from any cause. Accompanying the general chilling, or without it, the exposed parts (for instance, the ears, nose, fingers, toes, or even an arm or a leg) may become blue, purple, and then white and stiff.

Treatment. As quickly as possible get the sufferer into a warm place and remove the clothing. Then rub him with the hands or hot flannels and give hot tea, coffee, broth, or hot water. If the person is insensible, artificial respiration may be necessary.

Usually it has been taught that a frozen limb should be put into cold water or rubbed with snow, but experiments on animals have shown that, after exposure to cold, recovery is more rapid and sure when the animal is immersed in a warm bath which is made gradually warmer until it is as hot as can be borne. This, therefore, is recommended in all cases of severe chilling or frost-bite.

Accidents from electricity. The injured person should be at once removed from the influence of the current. This often entails great danger to the rescuer, who should have on, if possible, rubber boots or shoes and rubber gloves. If these are not at hand, the rescuer may be insulated by standing on something dry and thick that is not metal, such as a folded coat. Dry papers or cloth may be wrapped about the hands and used in laying hold of the person in danger, or in touching live wires. In dragging a person from the current, seize hold of the

clothing and not the hands or feet. A live wire may be dragged away with the wooden crook of a cane or umbrella, or with any dry stick, or with the insulated hands; or the current from a broken wire may be grounded by grasping the insulated portions with insulated hands and pressing the broken end against a metal pole or grating, or even into the ground. In cutting a live wire the hands or feet should be insulated.

Treatment. After removal from the current the injured person should be laid down with his head lower than his feet. Artificial respiration, if necessary, should be performed until a physician arrives, and other treatment employed as in shock. A physician should be summoned immediately.

Transportation of the injured. If it is necessary to move an injured person from one place to another, it should be done in such a manner as to cause him as little suffering and danger as possible. By unskillful handling the sharp ends of a broken bone may be thrust through the flesh or may cut into an artery, or the bleeding in a wound may be started afresh. Every particle of strength wasted by pain during the transit lessens the chances of recovery and may turn the scale on the side of death.

Never move an injured person until a careful examination has been made for possible fractures, and the necessary splints and dressings applied.

After the wound or fracture has been attended to, the sufferer should, if possible, be placed on a stretcher. For this a board, bench, door, shutter, or similar article may

be used. A stretcher may also be improvised from two poles with some support stretched between. For instance, take two coats, turn the sleeves inside out, button the coats, and run the poles through the sleeves.

To place a person on a stretcher. Three persons are needed to do this in the easiest and most comfortable manner, — two to act as bearers of the stretcher and one to attend to the injured part. Place the stretcher at the head of the patient on a line with the body, the foot of the stretcher being nearest the patient's head. One bearer kneels on each side of the patient and joins hands underneath his hips and shoulders with the bearer on the opposite side. The third man attends to the wounded limb or looks after any bandages or splints that may have been applied. The bearers then rise to their feet, raising the patient in a horizontal position, and, by a series of side steps, bring the patient over the stretcher. He is then lowered gently onto it and made as comfortable as possible. The taller of the two bearers places himself between the handles at the head of the patient, the other at the foot. The bearer at the head starts off with his left foot, the other with his right. If they should keep step, the stretcher would roll badly. The patient is carried feet first except in going upstairs or up a hill, when he is carried head first. If a stretcher or some substitute cannot be procured, the injured person must be carried by other means.

Other methods of transportation. Two persons join their hands together in the following manner: Each of the two grasps his right wrist with his left hand, back

uppermost. Then each grasps his companion's left wrist with his right hand. This forms what the children call a "lady's chair." The patient sits on this support, at the same time putting his arms around the necks of the bearers to steady himself.

If the patient is unable to sit in the "lady's chair," one bearer, standing behind him, passes his arms under the patient's arms and clasps hands over his chest. The other bearer stands between the legs, his back turned toward the patient's face, and passes his arms beneath the knees from the outside. The patient may now be lifted and carried.

To carry a person without the aid of others (for instance, a man who has been suffocated in a burning house), hold him in a chair while you place your shoulder against his abdomen; then throw the arm belonging to that shoulder around him and rise to the feet with his body hanging over your shoulder like a meal sack. His head and shoulders hang down behind, while his legs are in front. This method occupies only one hand, thus leaving the other free for use in descending a ladder or for other purposes.

To prevent the spread of contagion. On the occurrence of any of the contagious diseases the following precautions are to be taken: A room at the top of the house, capable of the most perfect ventilation, is chosen, the carpet taken up, and all hangings and all but the simplest furniture removed. After the room is thoroughly cleaned, the patient is placed in it, and the other inmates of the house are shut out. The nurse must have as

little communication with the household as possible. Her food and everything to supply the needs of the patient are placed on a table outside the door. The door is kept closed, and a sheet kept constantly wet with a disinfectant is hung up outside.

Disinfection. Disinfection, when properly carried out, is of extreme importance. When inefficiently done, it is very dangerous in giving a false sense of security.

The object of disinfection is to kill the germs of disease. These germs are often very tenacious of life and are not to be destroyed by simply creating a strong odor of some disfectant in a room. For the sick-room itself, while occupied by the patient, fresh air and scrupulous cleanliness are the best disinfectants.

For infected articles complete destruction by fire is, of course, an absolute disinfection, but articles that it is not desirable to destroy may be safely disinfected by boiling for one hour in water. The addition of a little washing soda to the water makes the disinfection more rapid. Articles which are not greasy may also be safely disinfected by soaking for an hour in a solution made by dissolving three ounces of pure (not crude) carbolic acid in a gallon of water. Infected bedclothing, underclothing, and handkerchiefs may be safely removed from the sick-room if inclosed in a soiled-clothes bag, pillowcase, or sheet soaked in the carbolic-acid solution. They must then be plunged, without being unwrapped, into boiling water and boiled for an hour. They may then be washed in the ordinary way. Knives, forks, spoons, and dishes should be washed with the carbolic-acid solution and

boiled for half an hour. Scraps of food should be burned. All discharges from the patient, including those from the mouth and nose, should be treated at once by the carbolic-acid solution or other disinfectants, or destroyed by fire. For the expectoration of consumptives, paper boxes are made, which must be burned before the expectoration becomes dry. Bedpans and similar utensils must be thoroughly washed with the solution, a little of which should be left in the utensil.

To disinfect water-closets, drains, cesspools, sewers, cellars, privies, yards, and stables, use fresh, dry chloride of lime or other disinfectant as directed by the physician.

QUESTIONS

1. Define shock. What are the symptoms?
2. Outline the treatment for shock.
3. What are contusions? How should they be treated?
4. Describe the condition of a joint that has been sprained.
5. How should sprains be treated?
6. How do dislocations differ from sprains?
7. Why is it inexpedient for unskilled persons to attempt to treat dislocations? What should be done while waiting for a physician?
8. What is a simple fracture? a compound fracture? Why is a compound fracture dangerous?
9. What treatment should be administered while waiting for skilled assistance?
10. Why are triangular bandages recommended for emergency cases instead of roller bandages?

11. Describe the triangular bandage. Learn to make and to apply one.

12. Give directions for making roller bandages.

13. Give directions for applying the roller bandage. Why should we avoid having it too tight?

14. Learn to make and to apply the roller bandage.

15. Give full directions for the treatment of apparent drowning.

16. Give directions for producing artificial respiration by the Schäfer method.

17. Practice the movements of artificial respiration with another person until you can do them without consulting the directions.

18. What besides being submerged in water will cause suffocation?

19. What precautions should be observed in attempting to rescue a person who has been overcome by gas or by smoke?

20. How does the treatment in such cases differ from that for apparent drowning?

21. Give full directions for the treatment of choking.

22. What should be done when buttons and such things have been swallowed?

23. What are the symptoms of ordinary fainting? Give directions for treatment.

24. How is stunning caused? What are the symptoms? What is the treatment? How does this treatment differ from that for fainting?

25. How is sun-stroke caused? What are the symptoms? Give directions for treatment.

26. Give directions for stopping the bleeding of wounds.

27. Describe the tourniquet and its use. Why should it not be applied unless absolutely necessary?

28. Give directions for stopping bleeding of the nose.

29. Give directions for the immediate treatment of wounds. How may simple sterilized dressings be obtained?

30. Explain what is meant by the healing of wounds by *first intention*; by *second intention*.

31. Why should small injuries always be treated carefully? Why not cover any wound entirely with surgeon's plaster?

32. What are infected wounds? How should they be treated?

33. How should dog-bites be treated? When should a physician be consulted? Why?

34. Why should a dog that has bitten a person not be killed at once?

35. Outline the treatment which should be given in all cases of poisoning.

36. Define an antidote. What is the antidote for poisoning by an acid? by an alkali? by carbolic acid? What is the treatment for opium poisoning?

37. How may a fire in a person's clothes be extinguished? How should the clothes then be removed?

38. How should burns be treated if slight? if severe?

39. Outline the treatment for frost-bite.

40. What precautions should be taken in trying to remove a person from the influence of an electric current?

41. How should a person be treated after removal?

42. Why should great care be exercised in moving an injured person?

43. What may be used as an improvised stretcher?

44. Give directions for placing a person on a stretcher. Why should the bearers not keep step?

45. Give directions for carrying a person in a "lady's chair." Demonstrate.

46. How may a person who is unable to sit in a "lady's chair" be carried by two bearers? Demonstrate.

47. How may a single bearer carry a person who is helpless? Demonstrate.

48. What precautions should be taken to prevent the spread of contagious diseases?

49. What is the purpose of disinfection? Why should it be done thoroughly?

50. Give directions for disinfecting the various articles used in a sick-room. How should water-closet drains etc. be disinfected?

APPENDIX

THE PARTS OF THE BODY AND THEIR WORK

Materials of the body. Any part of the body which has some special work to do is called an *organ.* Examples of organs are the eye, the ear, the skin, the heart, and the lungs. Since different organs have different work to do, they must have different structures and must be made of different materials. The materials in the body are called *tissues.* There are several kinds of these materials, or tissues, about which we ought to be informed. The principal ones are bone, muscle, nerve, fat, cartilage, epidermal tissue, and connective tissue.

Bone is composed of animal matter and limy material. The bones of adults contain about two parts of lime to one of animal matter. In the bones of children there is less of lime, and in those of old people there is more. For this reason the bones of children are less liable to be broken than those of older persons. In children, also, owing to the larger percentage of animal matter, broken bones reunite more readily.

The muscle, or flesh, is the most abundant of the building materials, making up about two fifths of the weight of the body. Its principal property is that of growing shorter and thicker when stimulated by the nerves. By this contraction all the movements of the body are produced.

The nerve material is of two kinds, called white matter and gray matter. The gray matter is principally in the brain and spinal cord, the chief nerve centers. The nerves are slender white threads which extend to every part of the body. They

carry messages (stimuli) to and from the brain and spine. Through them all the organs of the body are brought under the control of these nerve centers.

Fat occurs in the marrow of the bones, in the sockets of the eyes, and in a thin layer all over the body, especially in young people. It is the reserve material of the body, and also helps to keep the body warm.

Cartilage, also called gristle, is tough and elastic. It is used where bone would be too brittle, as in the ears, the windpipe, and the end of the nose. It is also used in the joints and between the ends of bones, to prevent jars.

Epidermal tissue forms the outer layer of the skin and lines the interior of the body, as in the mouth, the nose, and the throat.

Connective tissue consists of long fibers. It is found in every organ of the body and is used to bind the other materials together. It forms the principal part of tendons and ligaments and is abundant in the skin. It is this tissue that makes meat and leather tough.

Divisions of the body and what they contain. Now that we know something about the materials of which the body is composed, let us look at the body as a whole, to see how some of these materials are distributed and to learn what the body contains. Its main divisions are the head, the trunk, and the limbs. We will examine each of these divisions separately.

Head. The head contains the brain, with its bony covering, and the organs of special sense, for seeing, hearing, smelling, and tasting.

Trunk. The trunk is divided by a crosswise partition about in the middle. This partition is called the *diaphragm.* It is muscular and is used in breathing. The part of the trunk above this is called the chest or thorax. It contains the lungs

and heart, also the gullet and windpipe. The part below the diaphragm is called the abdomen. It contains the stomach, liver, pancreas, intestines, kidneys, bladder, and spleen.

Limbs. A cross section of any limb would show the following tissues: the skin in two layers, dermis and epidermis; a thin layer of fat just under the skin; muscle, the largest part; blood vessels and nerves, the large ones deep for protection; bone, the framework; and connective tissue, binding all the others together.

Classification of organs according to work. We have learned that the body is composed of a very complicated set of organs. We know something of their size, positions, etc., and of the materials of which they are made. It now remains for us to find out their functions, that is, what each one has to do to help maintain the activities of the body. For this purpose it has been found convenient to arrange the organs in groups according to the kind of work each is called upon to perform. These groups are as follows: organs of locomotion, of digestion, of circulation, of respiration, and of excretion, and the nervous system.

Organs of locomotion. These organs are the bones, cartilages, and ligaments of the skeleton and the muscles which cover them. The *bones* are of three kinds: long and slender, for motion and locomotion, as in the limbs; short, thick, and irregular, for support, as in the spine; and flat and broad, for protection, as the bones surrounding the brain.

Cartilages are used for cushions where the ends of bones meet, as at the joints and between the bones of the spine. They are also used where there is some motion between bones, but not enough to require a joint, as where the ends of the ribs are joined to the breastbone.

Ligaments are strong bands of connective tissue. They bind the bones together and limit their motion at the joints.

Muscles. There are more than five hundred muscles in the body. They are attached to the bones by tendons, — usually to two bones. When the muscle contracts, the bones are moved. With the assistance of joints not only *motion* but *locomotion* may be produced. The muscles also protect the internal organs. Some are under the control of the will and are called *voluntary* muscles, — for example, the muscles of the limbs; others are not under the control of the will and are called *involuntary*, — for example, the muscles of the heart and of the stomach. There are also some muscles that are partly voluntary and partly involuntary, — for example, the muscles used in breathing and the muscles used in winking. All muscles are under the control of the nervous system.

Organs of digestion. In general, food is prepared in the mouth, stored in the stomach, and digested in the small intestine. These parts, together with the throat, gullet, and large intestine, form what is called the alimentary canal. Digestion really starts in the mouth and is continued through the stomach and the small intestine. These organs, of themselves, are powerless to digest food without the assistance of certain glands, whose secretions are mixed with the food as it moves along through the alimentary canal. The principal of these are the salivary glands, the liver, and the pancreas. A complete list of the organs of digestion must therefore include the mouth (with the teeth and salivary glands), the throat, the gullet (esophagus), the stomach, the intestines (small and large), the liver, and the pancreas. Their combined function is to change the food to a form in which it can be absorbed into the blood. The saliva of the mouth acts upon starches and sugars; the gastric juice of the stomach, upon proteins (meats, fish, eggs, etc.); the bile of the liver, upon fats and oils; and the pancreatic juice, upon all three kinds of food.

Organs of circulation. After the food has been digested and absorbed by the blood, it must be carried to all parts of the body. Along with the food must go a supply of oxygen. To obtain food and oxygen, and to distribute them to the parts of the body which need them, is the work of the organs of circulation, which are the heart and the blood vessels. The heart is a double pump. With one side it receives blood returning from many parts of the body, and sends it to the lungs; with the other side it receives blood from the lungs, and sends it out again over the body. There are three kinds of blood vessels: arteries, veins, and capillaries. The arteries carry the blood away from the heart; the veins bring it back. The capillaries are very minute vessels which connect the arteries with the veins and form a network in every part of the body. It is from these that the tissues get their food.

Organs of respiration. While it is from the lungs that the oxygen of the air finds its way into the blood, all the organs that assist in furnishing and distributing the oxygen must be included in the organs of respiration. They are the mouth and nose, the throat, the windpipe, the lungs, and the blood vessels; also the nerves, muscles, bones, and cartilages of the chest. Their function is to supply the body with oxygen.

Organs of excretion. The indigestible parts of food pass through the intestines and out of the body, together with many of the poisonous substances formed in the intestines by bacterial action. Some of the latter, however, are absorbed by the blood and are carried directly to the liver, by which organ they are rendered harmless and are turned back again into the intestine, through the bile duct, to be expelled from the body. In this way the intestines and the liver serve as excretory organs, but they apparently have nothing to do with freeing the body of the products of oxidation. The organs doing this work are

the lungs, the kidneys, and the skin; and these harmful products leave the body by way of the breath, the urine, and the perspiration.

The nervous system. All the tissues and all the organs thus far described are powerless and useless of themselves, but under the control and direction of another set of organs they work together harmoniously, each contributing its share to that which goes to make up a living human body. This important system of organs, which is itself dependent upon the coöperation of all the others, is called the nervous system. It consists of the brain, the spinal cord, and the nerves. The brain, the most delicate of organs, is incased in the bony skull and contains the principal nerve centers. The spinal cord lies inside the backbone. Besides containing many nerve centers, it is a cable of nerves which extend all over the body. These nerves serve as lines of communication between the various organs of the body and the brain and spine, the centers in which originate every thought, purpose, and act of our lives.

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